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ABSTRACT

Two studies were conducted to determine whether outerdirectedness was an effective problem solving style for educable mentally retarded (EMR) students. In Study I, 60 EMR and 60 normal elementary Ss were presented easy or difficult tasks in one of three instructional conditions--relevant, irrelevant, or control. Glancing was measured to record whether Ss glanced at the task, the experimenter, or the room. Results tended to confirm the general theory of outerdirectedness. EMR Ss demonstrated similar amounts of glancing as the normal Ss for the irrelevant cue and control conditions. However, their total amount of glancing for the relevant cue condition was less than half as much as normal Ss'. In Study II, 35 mainstreamed ERR Ss were paired with normal peer models and completed a worksheet under one of the three instructional conditions--explicit, general, or control. Contrary to prediction, little glancing was manifested and there was no evidence that Ss were outerdirected or distractible. It was suggested that EMR Ss did not glance at information that was relevant and useful because of socialization, their need to appear self sufficient, and/or the dynamics of their general deficit. (CL)

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Outerdirectedness as a Problem Solving Strategy in EMR and Normal Children

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ABSTRACT

Outerdirectedness is [illegible] style [illegible] problem solving characterized by seeking cues to action [illegible] the immediate environment. It is asserted that the lower the Mental Age the more outerdirected the child, because outerdirectedness [illegible] more conducive to successful problem solving than depen[illegible] upon poorly developed [illegible] abilities. To determine [illegible] outerdirectedness is [illegible] effective problem solving strategy [illegible] were conducted. In Study I [illegible] equal numbers of normal and [illegible] children (MA 7 1/2) were [illegible]sented easy or difficult [illegible] of [illegible] instructions [illegible] relevant, irrelevant, [illegible] control [illegible] measurement [illegible] was [illegible]nded to record [illegible] glanc[illegible] at the [illegible] [illegible] [illegible]ter or the [illegible] [illegible] the [illegible] tend to [illegible] the general theory [illegible]directedness. [illegible] of the find[illegible] that the children glanced more when information was available and they looked long[illegible] difficult tasks. It was also found [illegible] the total amount of glancing varied according to the type of [illegible] available for the normal children. They glanced the most in [illegible] relevant cue condition, a moderate amount in the irrelevant cue [illegible]tion and very little glancing was observed in the control condition. The retarded children demonstrated similar amounts of glancing as the normal children for the irrelevant cue and control conditions. However, their total amount of [illegible]cing for the relevant cue condition was less than half as much as the normal children's. This

pattern was again evident in the frequency and duration of glances made to the experimenter's puzzle. It appears that the retarded children suppressed their glancing at the experimenter's puzzle when they were told they would do that puzzle next.

As an additional part of the experiment, the observers rated their estimate of the children's cognitive ability. On the whole, the observers were able to differentiate between retarded and nonretarded children. However they often were inaccurate and rated normal children as below average and retarded children as average.

In order to investigate how research in outerdirectedness could become more directly related to the classroom situation Study II was carried out. Due to the mainstreaming movement it was decided to investigate whether EMR children would look to their more capable peers for information. Also investigated was how direct the cue must be before children will look to their peers. Retarded children were paired with normal peer models and completed a worksheet under one of three instructional conditions - explicit, general or control. Each child did a form of the math worksheet first separately, then next to a peer and finally separately again. A second control group did the worksheets alone. The subjects were EMR children who were mainstreamed in intermediate classes (4th - 6th grades). Children of average or better ability were used as the peer models.

While the results of Study II did not reach statistical significance they shed light on the results of Study I and together the studies raise many interesting questions. The results are discussed in terms of socialization transcending adaptation. It appears that there are occasions when even though a child is having difficulty and helpful information is available, they decide to not look for cues to action. This suppression of glancing may be due to their socialization history and/or due to some dynamics of their general deficit.

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INTRODUCTION

Outerdirectedness is a style of problem solving characterized by "seeking guides to action in the immediate environment" (Zigler, 1966, p. 99). It is thought to be related to two factors: The level of cognition attained (e.g., MA) and the degree of success experienced through employing whatever cognitive resources the child has available (Turnure & Zigler, 1964). Turnure and Zigler assert that the lower the MA the more outerdirected the child, because outerdirectedness is more conducive to successful problem solving than dependence upon poorly developed cognitive abilities. In normal development, the shift from outer- to innerdirectedness is a product of the increasing cognitive ability of the child and the withdrawal of external cues which had previously made the outerdirected style an effective one.

The concept of outerdirectedness appears to be in accordance with Kohlberg's (1969) theory of imitation. The two underlying assumptions of Kohlberg's cognitive developmental theory are that development involves a basic transformation of cognitive structure and that there is a primary motivation for competence. His theory of imitation states that children gain normative information from imitation. He asserts that the primary condition that arouses imitation is a need for knowledge. The child imitates when there is a moderate degree of a mismatch between his capabilities and the behavior of the model. Imitation is stopped when there is a better degree of match between the child's behavior and the model; that is when the child has achieved a state of mastery. Another powerful determinant of imitation is the child's cognitive uncertainty as to his ability to succeed in the task on his own. At this time, the child can look to the environment for cues to guide his actions. This can be considered a form of imitation, or more specifically, outerdirectedness. It is considered to be a means of gaining knowledge. Kohlberg further states that it is the value of information, rather than reinforcement that maintains imitative action. This is a developmental theory that states there is a curvilinear trend in imitativeness. In the 3-4 year old period, imitativeness of an adult model is increasing and during the 6-8 year old period it is declining (Kohlberg & Zigler, 1967).

Depending upon the task situation, outerdirectedness can be either beneficial (e.g., Turnure & Zigler, 1964) or detrimental (e.g., Achenbach & Zigler, 1968). The original investigation of outerdirectedness was conducted by Turnure and Zigler (1964). In Study I, retarded and normal children with an MA of 8 either experienced a success or a failure condition on several games and were then tested on an imitation task. In Study II, retarded and normal children with an MA of 7 1/2 performed two object assembly tasks and an imitation task. In the experimental condition the experimenter completed a puzzle while the child completed his first puzzle. Then the child was presented his second puzzle which was the one that the experimenter had previously completed. The experimenter recorded the child's score on the object assembly tasks and the number of glances, defined as an overt head movement in the direction of the experimenter, the child had made. Finally, an imitation task was administered to the child.

In Study II, if the child attended to the experimenter, his performance on the first object assembly task would be hindered but, if he indeed has been seeking information, his performance on the second object assembly task would be facilitated. The retarded experimental group exhibited more outerdirectedness on this first puzzle as measured by glances toward the experimenter, than did the MA matched normal group. The retarded experimental children's performance on the first task was poorer than the normal groups, however, their performance was superior to the normals on the second task. Furthermore, on the imitation task, it was reported that retardates were more imitative than normals. Also, all of the children were found to be more imitative following the failure than the success condition in Study I.

In a discriminative learning task, Achenbach and Zigler (1968) demonstrated that retardates could learn a three choice relative-size discrimination as quickly as MA matched normals. However, in the experimental condition when an obvious cue was provided, retardates relied on the cue significantly longer than normals. It was demonstrated that this reliance on an external cue, or outer-directedness, involved an inhibition of learning; the subjects tended to rely on the concrete situational cue rather than to attempt to deduce abstract relationships.

More research is needed to further refine the concept of outer-directedness as well as to attempt to have the laboratory work relate more closely to educational settings. As previously indicated, outer-directedness may appropriately be considered an information seeking strategy. The child's glancing about, or outerdirectedness, may for instance be a cue to the teacher that he is ready to receive new information or material (Turnure, 1970a). According to Hunt (1961) learning occurs when there is an appropriate match between the circumstances that a child encounters and the schemata that he has already incorporated into his repertoire. The teacher usually must rely on intuition to know when new information will be most effectively received. The child's outerdirectedness behavior may prove to be an effective cue to the teacher.

There are many questions related to outerdirectedness that need to be more fully addressed. Some necessary information can be gained through laboratory investigations, some from extensive classroom observations and teacher interviews. Under what conditions does outerdirectedness facilitate a child's performance? Are cues helpful to a child on all tasks or only on certain tasks, such as difficult ones? What may influence the child to either look for cues in the environment or to rely on his own cognitive abilities to solve a problem? How direct must the cues be? Can the child generalize the information gained from one situation to a related task? Finally, the issue of helping the child become more innerdirected needs to be investigated: Is there a proper time to encourage a child to rely more on his own cognitive abilities and how is this goal accomplished?

There may also be wide individual differences between children in their amount, styles or motivation for outerdirectedness. By investigating the parameters of outerdirectedness, we may be in a better position to help teachers match their mode of presentation of materials to the child's best way of processing information (Shumsky, 1968).

While research in outerdirectedness may prove valuable for work with all children, it seems especially relevant to work with retarded children. Outerdirectedness is thought to relate to the child's level of cognition and his success or failure experiences in employing his cognitive resources. Due to mentally retarded children's slower rate of cognitive development, they may remain longer at the stage where outerdirectedness is a principal means of gaining information. Compounding this, retarded children have many failure experiences, especially when tasks are presented to them that may be appropriate for their CA but not their MA. Therefore, it appears that outerdirectedness may be a prevalent information seeking strategy for retarded children.

Relevant Literature

The influence of failure experiences on the degree of outerdirectedness has been relatively well documented (MacMillan &

Cauffiel, 1973; Sanders, Zigler & Butterfield, 1968; Turnure, 1970; Turnure & Zigler, 1964; Yando & Zigler, 1971). These studies have shown that failure experiences tend to increase outerdirectedness. One recent study (Maguire, 1976) reported that experimentally induced failure experiences caused no significant differences in the degree of outerdirectedness exhibited by either retarded or nonretarded children. However, Maguire stated that the conflicting findings of her work and Turnure and Zigler's (1964) study may be explained by methodological differences (e.g., amount of failure experienced by the subjects, level of retardation, and methods of statistical analyses).

The developmental nature of outerdirectedness in both retarded and nonretarded children has also been an area of much research. It has been demonstrated that outerdirectedness decreased with MA among nonretarded (MacMillan & Wright, 1974; Ruble & Nakamura, 1973; Yando & Zigler, 1971; Zigler & Yando, 1972) and institutionalized retarded persons (Balla, Styfco, & Zigler, 1971; Turnure, 1970). In retard to noninstitutionalized educable mentally retarded (EMR) children, Balla et al. (1971) and Gordon and MacLean (1977) provided evidence supporting the outerdirected hypothesis, although some studies have not been fully supportive (Achenbach & Zigler, 1968; Massari & Mansfield, 1973).

Whereas it has been shown that failure experiences and MA can influence the amount of outerdirectedness exhibited, further research is needed to assess when this reliance on cues in the external environment is, in fact, an effective problem solving strategy. It seems important to investigate variables that may clarify our understanding of outerdirectedness as a problem solving strategy.

Outerdirectedness as a Problem Solving Strategy

It is proposed that one approach to determine whether outerdirectedness is an effective problem solving strategy is to investigate the relation of task difficulty and outerdirectedness. Since outerdirectedness is related to cognitive ability, it appears that task difficulty would have a direct relationship. It has been demonstrated (e.g., Ruble & Nakamura, 1973; Balla et al., 1971; Yando & Zigler, 1971) that there is an inverse relationship between outerdirectedness and MA. By similar reasoning, one should observe more outerdirectedness when a task is difficult than when a task is simple.

Ruble and Nakamura (1973), in a study involving kindergarten through third grade normal children, explored the relationship between task difficulty and outerdirectedness. First and second graders were instructed that their task was either easy or hard, and were presented with tasks that matched their instructions. Kindergarten and third graders were similarly instructed, however, they were all presented with difficult tasks. It was reported that children glanced more when they expected the task to be hard in all cases except for third grade girls. Furthermore, in conditions where there was an actual difference in task difficulty (i.e., first and second grade rs), there was a trend (although statistically and nonsignificant) for glancing to be more affected by the manipulation than in the conditions where difficulty was manipulated only by instruction (i.e., kindergarteners and third graders).

Turnure (1970a) stated that task difficulty may influence non-task orienting behavior. It was reported that the glance scores of retarded children were three times those of the normal CA matched subjects. This was interpreted as indicating that the retarded look to the environment often when presented with tasks that are appropriate for their CA but not their MA. There were also very high glance indices by the 4 1/2 year old normal subjects for whom the task was also extremely difficult.

The importance of investigating task difficulty has also received indirect support by Achenbach and Zigler (1968). They did not find a constant negative relation between MA and cue dependence as suggested by the outerdirectedness theory. In their first experiment there was no difference between the performance of children of the two MA levels in the normal, or the institutionalized and noninstitutionalized retarded groups. The authors suggested that the failure to find an MA effect may be due to the task being perceived as equally easy by children of both MA's. This is indicated by the similarity of the performances of both groups in the control condition. In Experiment II, a discrimination task that was more difficult for all subjects was used. The results here suggested that when the task was difficult for all subjects, normals became as cue dependent as mentally retarded children.

It is proposed that a second variable which should be investigated to determine whether outerdirectedness is an effective problem solving strategy is the type of information available and its effect on a child's utilization of external cues. The question must be further addressed to determine when off-task glancing reflects outerdirectedness and the child's attempt to seek available information and when it constitutes simple inattentiveness. Most relevant studies indicate that outerdirectedness does reflect the child's attempt to seek information. Drotar (1972) and Turnure and Zigler (1964) reported more glances under the experimental conditions (i.e., when information was available) than in the control condition. Furthermore, the experimental groups showed a marked reduction in glances when the experimenter was not providing any information.

Turnure (1970b) also provided further support for the hypothesis that nontask orienting by the retarded reflects an information seeking strategy rather than a vacuous orienting to stimuli in the environment (distractibility). In this study there was a relevant cue condition in which the experimenter tilted his head toward the correct stimulus and an irrelevant cue condition in which the experimenter kept his head on the median plane. While not statistically significant, it was found that the subjects in the relevant cue condition showed an increase in performance as well as in glancing behaviors. Further studies have obtained similar results (Turnure, 1973; Turnure, Larsen, & Thurlow, 1976).

However, an increase in glancing has not always resulted in the subjects better utilizing information made available by the experimenter. Drotar (1972) modified Turnure and Zigler's (1964) design by adding a dissimilar cue condition in which the experimenter completed a puzzle that would not be done by the subjects. This condition was added in order to test whether or not the retarded children were attending to the experimenter's assembly (gaining information) when they were glancing at the experimenter. The findings supported Turnure and Zigler's prediction that the retarded children's attention to the experimenter's assembly would depress their task scores relative to those of the nonretarded children for both the similar cue and dissimilar cue condition for Task 1. However, contrary to prediction, the retarded children in the similar cue group did not score significantly above the nonretarded on Task 2. There were no significant effects for Task 2 scores. Several methodological issues must be mentioned here. The subjects' characteristics, such as their IQ, were different between the two studies. Furthermore, it was reported by Drotar that while the retarded children in the similar cue condition scored above nonretarded children on Task 2 as predicted, this difference was not significant. However, ceiling effects apparently precluded finding the predicted difference between retarded and nonretarded children.

MacMillan and Wright (1974) investigated outerdirectedness with a sample of second, fourth, and sixth grade normal children. The procedure used was similar to Turnure and Zigler's (1964), except that MacMillan and Wright only used time required to assemble the puzzle whereas Turnure and Zigler had a scoring system for the number of piece correctly assembled with a bonus available for quic assembly. Turnure and Zigler note that the time bonus did not significantly change the findings. MacMillan and Wright reported results opposite the prediction of outerdirectedness namely that subjects who rapidly completed puzzle 2 tended to be those who glanced very infrequently while assembling the first puzzle.

However, it is suggested that the use of response time alone tends to mask some of the information that is important when investigating outerdirectedness. Higgins (1977) and Turnure (1973b) noted that response time and performance tends to be a curvilinear relation. Very quick reaction times were exhibited by subjects who made very few errors as well as by those who made very many errors. That is, the quickest responders are those subjects who are very competent and confident as well as those who are responding on a chance basis. It is suggested that it is the subjects who have moderate response time that are in the process of learning the tasks.

In summary, two important variables that need to be addressed to clarify whether outerdirectedness is a problem solving strategy are task difficulty and information availability. A concurrent methodological issue which needs to be addressed is the use of glancing as a measure of outerdirectedness. It is proposed that to further understand outerdirectedness as a problem solving strategy, it is necessary to refine and expand upon the glancing measure.

Whereas glancing is a good direct measure (Belmont & Butterfield, 1977) of outerdirectedness, much of the past research has relied on rather gross measures of glancing. A subject was scored for glancing when he made an overt head turn toward the experimenter. However, it is suggested that it would be more informative to refine the measure as Ruble (1975) did. Her scoring procedure involved recording not only the frequency of glancing but also whether the glance was made to the experimenter, to the room, or to the task.

To effectively use this expanded measure of glancing it would be necessary to have separate observers and experimenters. Most research has involved only an experimenter who was responsible for observing the child's behavior on the experimental task as well as the child's glancing behavior. With this expanded measure of observing glancing, the observers would need a clear view of the child, the experimenter and the experimenter's task. In order to assure this view, it would be necessary to place the observer directly in front of the child and the experimenter. It appears that having the observer out in the open is similar to a normal classroom situation where many people are around. The alternative would be hiding the observers behind a screen or other shield. However, it is possible that this procedure would prove to be a powerful and unnecessary distractor if the child becomes more interested in trying to figure out what is behind the shield and why it is in the small room.

In conclusion, many people, both practitioners and researchers, believe that when a mentally retarded child is looking about in a learning or testing situation, it is a sign that the child is distracted. However, rather than accepting this conclusion and positing a behavioral or physiological deficit within the mentally retarded child, a more specific and functional explanation for the behavior can be advanced. It is suggested that any child's glancing about can be a means of gaining needed information from the environment. This is in contrast to viewing the glancing as distractibility. It has been demonstrated that both normal and retarded children are more outerdirected after failure experiences (Sanders, Zigler, & Butterfield, 1968; Turnure & Zigler, 1964). Researchers have also noted that the children do discriminate in their outerdirectedness and glance more when information is available (e.g., Drotar, 1972; Turnure & Zigler, 1964). Furthermore, some research has demonstrated that while children do glance around, the actual amount of time involved during an experimental task is quite low. Turnure (1970b) reported an average of less than 10% of the time was involved in nontask orientation. Turnure (1970a) demonstrated that outerdirectedness is greater in retarded as well as normal children when the task was not commensurate with their mental abilities. As Turnure notes, a logical analysis of these findings appear to explain why greater distractibility and nonattentiveness have been attributed to the retarded. In many situations, especially classrooms, when normal and retarded children are compared, the task is normative and so appropriate for the group's CA, but, obviously, not the retarded child's MA. Therefore, it appears that the normal child orients to the task much better than the retarded. However, only when the tasks are equivalent for the differential mental abilities of the children can valid comparisons be made.

This comparative area is especially germane now, since there is a move towards mainstreaming retarded children into normal classrooms. An issue for all educators is the impact that mainstreaming will have on children. A question that directly relates to outer-directedness and teaching is whether mentally retarded children can use their more capable peers as sources of information. One needs to investigate whether mentally retarded children should be encouraged to look to their "normal" peers for assistance and how direct this assistance needs to be. Farnham-Diggory (1972) notes that this type of learning has two advantages for all children. First, it does not call attention to the target child's difference. Furthermore, it permits the target child to decide for himself which behaviors he wishes to observe or imitate and which ones he will carry out on his own. She has urged further research on these issues.

While teachers ascribe great importance to students' attention, relatively little research has been concerned with the relationship between direct measures of students' attentiveness and academic success. Lahaderne (1968) and Samuels and Turnure (1974) have demonstrated that overt task relevant orienting behavior was related to scholastic achievement. These findings were demonstrated with older students as well as with first graders.

Although it is important to directly measure attention and its relationship to academic achievement, it is necessary to refine the measures used. The current procedures have been concerned with the simple linear relationship between amount of attending behaviors and achievement. However, it is not simply a question of the quantity of attention increasing, but also the quality; the child must learn how and where to attend. In fact, Yussen (1973) noted that older children did not differ from younger children in the quantity (duration) of attention exhibited, but differed in more qualitative ways, by looking more only during those times when important information was available.

It is obvious that eye orientation is a direct and valid measure of attention. Since outerdirectedness is looking to the environment for cues, the child's visual orientation to the environment must be measured. It is important to monitor the distribution of attention as well as the frequency and duration of non-task orientation. By monitoring glancing, it should be possible to investigate the child's attentive behavior precisely and not only in an experimental setting. This is a behavior that is obvious and easy to observe in a classroom or any other setting, and is probably the primary index of attentiveness relied on by teachers.

Another methodological issue that needs to be addressed is the matching of the normal and retarded children. It is important that the two groups of children have similar cognitive skills. It is possible to match the children on a composite IQ score or on their performance on a task that is very similar to the experimental task. Berkson (1966) has noted that a high degree of behavioral variability characterizes groups of retarded individuals constituted only on the basis of IQ. It is important to know what skill level the children have on a task that taps the skills that they will need on the experimental task. This issue is related to what Baumeister (1967) called the most fundamental problem in comparative research which retarded and normal children. The problem is insuring that a task is an equivalent measure of the same psychological processes for both retarded and normal children. A puzzle assembly task will be used as the experimental task. Therefore, the children will be matched on their performance on the Block Design subtest of the WISC-R. This is also a manipulative type task that requires a child to integrate parts to make a whole.

Two experiments are proposed that would investigate outerdirectedness as a problem solving strategy of EMR and normal children. The first study would directly examine the effects of task difficulty and the type of information available on the outerdirectedness behavior of children. The study would examine these variables in a factorial design, with two levels of task difficulty and three levels of type of information available for both EMR and normal children. The second study would examine the effectiveness of placing EMR students next to more capable students. It would investigate under what conditions EMR children would look for assistance from their peers and how this outerdirectedness would affect their performance on a learning task.

While Study I is concerned with variables that have direct implications for classroom application, Study II is an important complement. The latter study investigates the effectiveness of peers as information agents. It is important to include this aspect of the study since the amount of time a teacher can spend on a one-to-one basis with a child is necessarily limited; however, children are usually in close contact with each other. It would prove more efficient and practical to use a peer rather than a teacher if both can be used effectively to impart information.

STUDY I

METHOD

Experimental Design

Equal numbers of normal and retarded children were presented easy or difficult tasks in one of three instructional conditions--relevant cues, irrelevant cues, or control. Their performance on two puzzles was scored. The design was thus a 2 (Group) x 2 (Task) x 3 (Instructions) x 2 (Trials) mixed factorial design. Pretesting was undertaken to identify easy and difficult puzzle assemply tasks for children with MAs of approximately 7-1/2.

Subjects

The subjects were 60 EMR and 60 normal children who attended urban elementary schools and represented a wide range of SES backgrounds.

It was decided that all children should be functioning at approximately a 7-1/2 year old level. Research by White (1965) indicated that most children by this age are autonomous problem solvers, or inner-directed, when presented age appropriate tasks.

The criteria for inclusion into the study for the EMR children were that they be classified by the school district as GLD [EMR]. See Appendix A. They also needed to have a raw score of at least 6 on the Block Design and a scaled score of 8 or below. Their Block Design scores ranged from 6 to 25, with a mean of 14.0. This mean is a score that one would expect of a normal child approximately 7.8 year old (WISC-R). The mean CA for the MR children was 11.7 years old.

The normal children were first graders whose Block design scores ranged from 6 to 24, with a mean of 14.3. The average CA of these children was 7.9 years old. This information is presented in Table 1.

The children were assigned to conditions so that each group of 10 would have equivalent Block Design scores and so that the proportion of males and females in any cell did not exceed 70-30. An analysis of variance performed on the children's Block Design score and test age equivalent demonstrated that there were no significant differences.

Apparatus

Puzzles adopted from the WISC-R object assembly tests were used as the experimental task. Pretesting established puzzles that were easy or difficult for children of about a 7-1/2 MA to assemble. The easy puzzles were 4 piece puzzles of a horse and elephant that have been used in previous research (see Turnure & Zigler, 1964). These puzzles were the same size and color as those used in the WISC-R. They were also structurally similar to one another except that a triangular piece cut from the middle of each figure fitted one when the base of the piece was aligned along the ventral border, and the other when it was aligned along the dorsal border.

The difficult puzzles were eight piece puzzles of a face and a car. The face was the same as the one in the WISC-R object assembly task and the car was a slight modification of the WISC-R puzzle. To

Table 1

CA, Block Design Score, Scaled Scores of Groups

	N	CA in months		BD		SS	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Normal							
Easy Relevant	10	87.2	4.44	14	5.81	11	1.94
Easy Irrelevant	10	85.9	4.23	14.2	6.20	10.9	2.40
Easy Control	10	86.0	3.80	14.3	4.64	11.1	1.45
Hard Relevant	10	86.6	4.55	15.1	6.48	11.1	2.03
Hard Irrelevant	10	84.0	3.65	14.3	4.92	11.3	1.64
Hard Control	10	87.1	3.57	13.9	5.55	10.8	1.87
Retarded							
Easy Relevant	10	139.5	9.36	14.0	5.72	5.5	1.90
Easy Irrelevant	10	135.8	9.05	14.3	6.27	5.7	1.89
Easy Control	10	142.7	12.30	13.6	5.66	5.0	2.67
Hard Relevant	10	143.7	11.80	14.4	7.28	5.0	2.45
Hard Irrelevant	10	138.2	12.20	13.7	5.01	5.8	1.55
Hard Control	10	140.1	14.54	13.8	5.85	5.3	2.16

equate the number of pieces that tasks had, a piece of the car was divided, thereby producing eight pieces. Following the division lines used in the WISC-R which had divided the 3 detailed wheels each into 2 parts, the front end piece was divided through the grill and tire. The front piece measured 1 23/32" x 1 25/32" and the back piece measured 2 28/32" x 2". For the irrelevant cue conditions, the E assembled puzzles that were different from the children's puzzles. For the easy condition she assembled the doll puzzle of the WISC-R object assembly. The WISC-R object assembly puzzle of the horse was used for the difficult condition.

Observations of glancing behavior were recorded by means of a Rustrak Event Recorder. Chart paper for the event recorder was used to record the movement of the pens. The recorder was operated at a speed of 1/4 inch (.63 cm) of chart paper per 3 seconds. Hand switches were connected to the terminals at the back of the event recorder to activate three of the four pens. The pens recorded continuously in a straight line on the moving roll of chart paper. When a switch button was pressed, the activated pen moved approximately 2/32 of an inch to the right and continued marking in a straight line until the button was released. Upon release of the button the pen returned to the original line and continued marking the chart paper. This procedure allowed the continuous measurement of orienting responses and resulted in a record of the duration, frequency and location of the child's glancing behavior (Turnure, 1965; 1970; Nathanson, 19).

The observers were trained by use of videotapes of children and by practice subjects. They pressed the switch button that activated Pen 1 when the child looked to the experimenter herself, Pen 2 when the child looked at the experimenter's puzzle, and Pen 3 was activated when the child was glancing about the room. The event recorder was plugged in while the principal investigator was talking with the child and the observers recorded the child's glancing behavior throughout the entire session. To better analyze the glancing process and relate it to behavior, the session was divided into several segments. To demarcate the beginning of each segment all three buttons were simultaneously and quickly pushed. The segments were: instructions, Puzzle 1, the interim period, the second set of instructions, and finally, Puzzle 2.

For 34% of the children two observers were used. In order to insure they were scoring independently, several precautions were taken. The observers were separated from each other as much as possible, while still providing both observers a clear view of the child and his/her surroundings. The observers pressed a key connected to the Rustrak according to where the child glanced; however, these keys were not readily observable to the other observer. Finally, when the pen was activated, it made a slight clicking noise. However, the machine also made sporadic clicking noises when the pen was not activated, therefore a click was not a signal that an observer was scoring a glance. Furthermore, these sounds were muffled by towels placed around the machine and by room noises (such as a fan).

Procedure

The subjects were taken from their classrooms by the principal investigator who was the only member of the experimental team with knowledge of the child's classification. The experimenters and observers were blind to the exact design of the experiment, the hypotheses and the children's classification.

All children were escorted to a room in their school which contained a table with two chairs situated side by side. The child was directed to a chair to the left of the experimenter and in front of the observer(s).

Before the child entered the room the E placed the pieces of the appropriate puzzles on the table under cardboard shields. The order of presentation was counterbalanced, half of the subjects in the easy condition were given the horse first, half the elephant first. For the children assigned to the difficult condition, half received the car first while the others received the face first. The experimenter also completed a puzzle for the experimental conditions; either the second object assembly puzzle or an irrelevant puzzle. See Table 2 for a chart of the puzzles.

The child was introduced to everyone in the room by the principal investigator. Each child was told:

> This is (experimenter's name). She is going to do some puzzles with you today. And this is (observer(s)). She is here to watch (experimenter's name). She wants to see how (E) does puzzles with children like you. Any questions? OK. Also in this room you may hear some

Table 2

Puzzle Presentation by Condition

	A		B	
	Puzzle 1	Puzzle 2	Puzzle 1	Puzzle 2
Easy Relevant				
Experimenter	Elephant		Horse	
Child	Horse	Elephant	Elephant	Horse
Easy Irrelevant				
Experimenter	Girl		Girl	
Child	Horse	Elephant	Elephant	Horse
Easy Control				
Experimenter				
Child	Horse	Elephant	Elephant	Horse
Hard Relevant				
Experimenter	Car		Face	
Child	Face	Car	Car	Face
Hard Irrelevant				
Experimenter	Horse		Horse	
Child	Face	Car	Car	Face
Hard Control				
Experimenter				
Child	Face	Car	Car	Face

> noises because this is a noisy room sometimes. But those noises aren't important and you can just ignore them. OK? I'll let (E) tell you about the puzzles and at the end, we'll walk back to your classroom.

After the child was seated the experimenter engaged in limited conversation with the child until it appeared the child had become accustomed to the situation. The experimenter then gave the appropriate instructions and kept further interaction to a minimum. The experimenter attempted to maintain a pleasant but neutral attitude throughout the study and no rewards or information as to success or failure were given.

Once the experimenter uncovered the puzzle pieces, she gave the following instructions:

> Relevant Cue Condition: Here are some pieces of a puzzle. When you put them together they will make something you know. I want you to put them together as quickly as you can. While you are putting yours together, I will put one together too. After you finish your puzzle, you will then do my puzzle. Any questions? O.K. Here's your puzzle. Put it together as quickly as you can.

> Irrelevant Cue Condition. Here are some pieces of a puzzle. When you put them together they will make something you know. I want you to put them together as quickly as you can. While you are putting yours together, I will put one together too. After you finish your puzzle, you'll do another puzzle that is different from your puzzle and my puzzle. Any questions? O.K. Here is your puzzle. Put it together as quickly as you can.

> Control Condition. Here are some pieces of a puzzle. When you put them together they will make something you know. I want you to put them together as quickly as you can. Any questions? O.K. Here is your puzzle. Put it together as quickly as you can.

With the experimental groups, the experimenter quickly assembled the appropriate puzzle and left it in view for 10 seconds. The puzzle was then disassembled and the pieces left in view for 30 seconds. If the subject was still working on his task, this cycle was repeated. Although this procedure results in subjects being exposed to differing amounts of cues, Turnure and Zigler (1964) note that this procedure appears appropriate to adequately test outerdirectedness. If an experimental subject, normal or retarded, persists in his attention to cues provided by the experimenter, then cues should be made continuously available in order to maximize the hypothesized improvement on the second task. For the control subjects, the experimenter remained next to the subject, but, of course, did not assemble any puzzle.

When the subject completed the task or after a three minute time limit elapsed, the experimenter covered her own puzzle pieces and recorded the subject's score for task one and the time required by the subject to complete the puzzle. Puzzle 1 was removed and pieces of puzzle 2 were placed in front of the subject. The experimenter said:

> Here is another puzzle to put together as quickly as you can. Any questions? O.K. Here is your puzzle. Put it together as quickly as you can.

The experimenter did not perform any activity while the subject assembled Puzzle 2. After the subject completed the second puzzle the experimenter recorded both the subject's score and the time it took the subject to complete the puzzle.

Each child was praised at the end of the session and told how hard they had worked and how well they had performed. The child was then escorted back to his/her room by the principal investigator.

After the child left the room, the experimenter and observers independently rated their estimates of the child's cognitive level. A five point scale was used including low, low average, average, above average, and high. This measure was used to investigate whether the observers of the child could accurately detect whether the child was retarded or non retarded. The observers knew that the children would range from low to high in their abilities but did not know the experiment was using half retarded and half normal children.

Object Assembly Scores

Turnure and Zigler's (1964) scoring system was used. For the easy tasks, the score was computed by giving 1 point for each piece of a puzzle correctly placed, with 5 points being given if all four pieces were correctly joined to form the object. Following the Wechsler scoring system which includes a time bonus for rapid completion, a bonus of 2 points was given for assembling the puzzle correctly in 15 seconds or less and a bonus of 1 point was given for assembling it between 16 and 30 seconds. For the difficult conditions, the scores were computed by allowing 0.5 point for each piece of puzzle correctly placed, with 5 points being given if all eight pieces were correctly joined to form the object. As with the easy puzzles, time bonuses were given for quick assembly. A child earned 2 bonus points for assembling the object in 35 seconds or less and a bonus of 1 point for correctly finishing the puzzle between 36 and 75 seconds.

RESULTS

Puzzle Scores

Since the scores on Puzzle 1 and Puzzle 2 are inter-related a multiple analysis of variance (MANOVA) was performed on the scores the children received for their performance on both puzzles. The results indicated a main effect for difficulty level (F [1,107] = 9.13 $p \leq .01$). The easy condition puzzles were in fact easier than the difficult condition puzzles and resulted in significantly higher scores. See Table 3 for mean scores.

In order to look at each task individually, a 3-way analysis of variance was performed on the puzzle scores for Task 1 and Task 2 separately. On Task 1, the easy puzzle had a mean score of 4.38, while the difficult puzzle had a mean score of 3.62. This difference is significant (F [1,108] = 4.9 $p \leq .05$).

However, the finding of a two-way interaction of Group and Difficulty level that was close to significant (F [1,108] = 3.7, $p \leq .056$) brings the main effect into some question. As can be seen in Figure 1, the normal children have approximately equivalent scores under both conditions, while the EMR children's scores are differentially affected by the manipulation. Also when an analysis of variance of the Puzzle 1 scores that did not include a time bonus was performed, there were no significant results.

Table 3

Puzzle Scores for Group by Difficulty and Instructions

	Puzzle 1		Puzzle 2	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	4.0	2.05	5.0	1.16
Easy Irrelevant	3.7	1.70	3.9	1.60
Easy Control	4.5	1.58	5.3	1.89
Hard Relevant	4.65	1.96	3.60	1.45
Hard Irrelevant	3.70	1.44	2.35	1.51
Hard Control	3.55	1.44	3.80	1.83
Retarded				
Easy Relevant	4.4	2.41	5.5	1.08
Easy Irrelevant	5.2	1.55	4.4	2.17
Easy Control	4.5	2.80	4.3	2.31
Hard Relevant	3.35	1.53	3.05	1.57
Hard Irrelevant	3.40	1.51	4.3	1.81
Hard Control	3.05	2.15	3.6	1.58

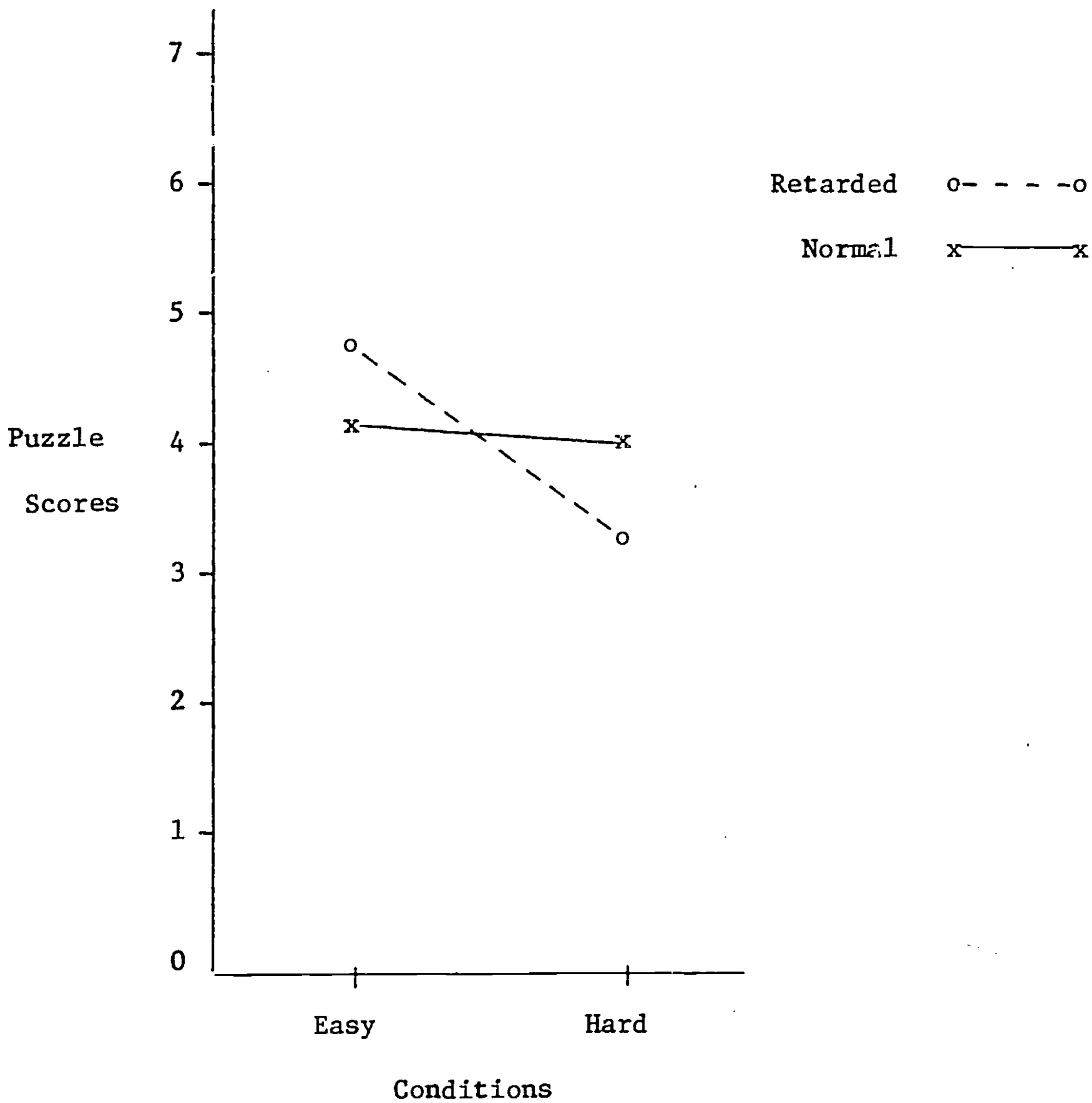

Figure 1. Puzzle 1 scores for retarded and normal children by task difficulty.

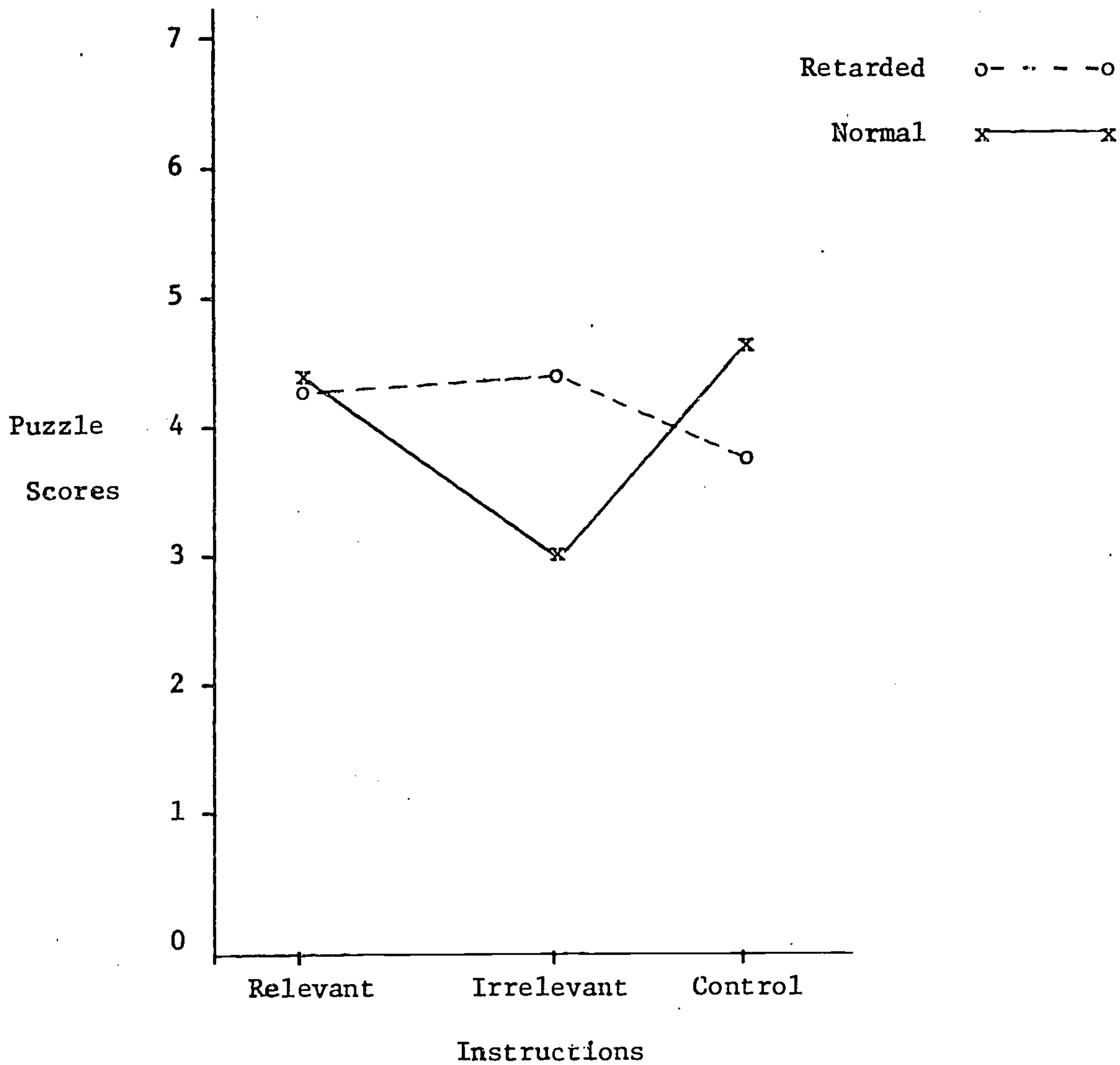

Figure 2. Puzzle 2 scores for retarded and normal children by instructions.

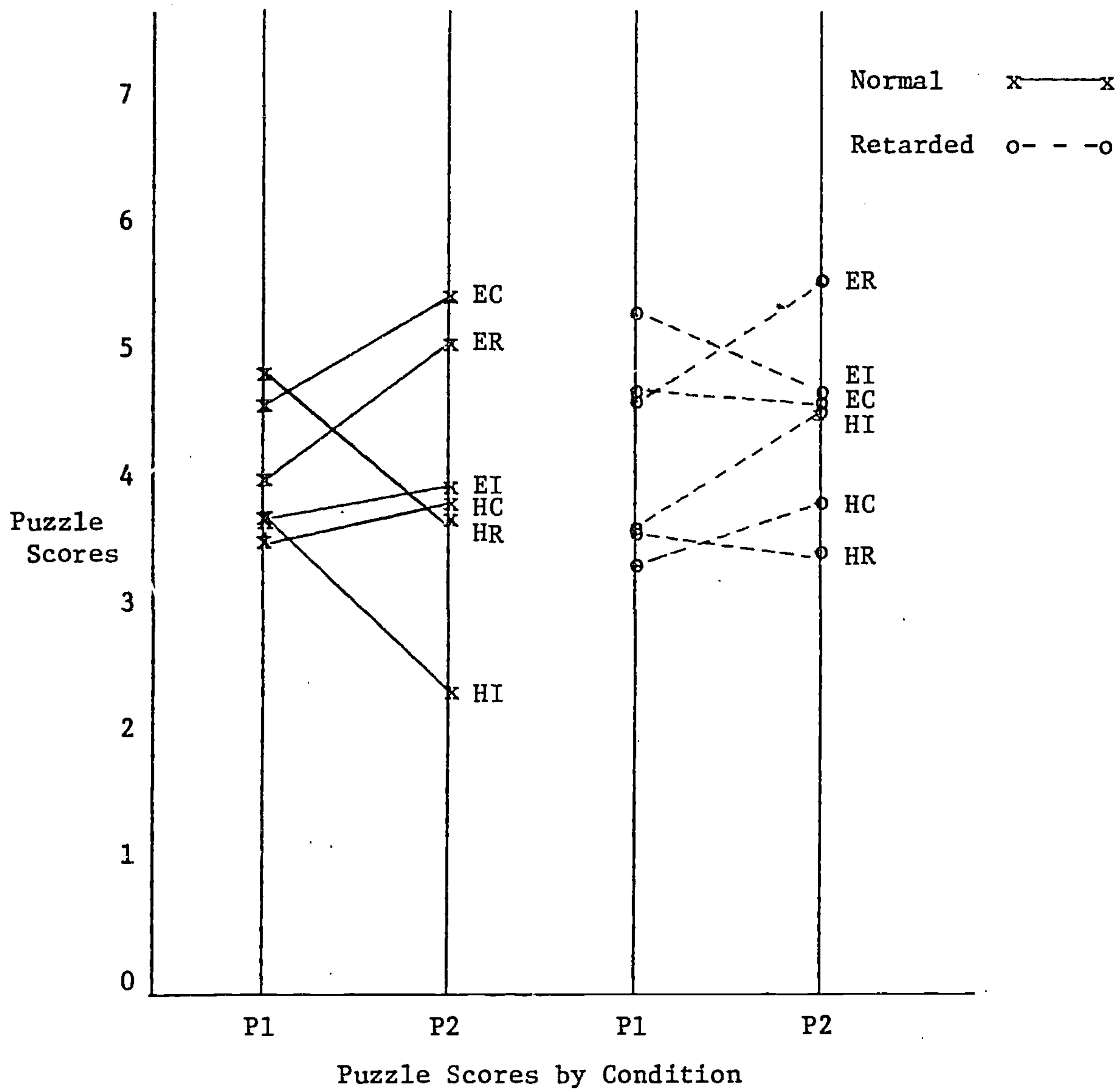

Figure 3. Puzzle 1 and Puzzle 2 scores for groups by task difficulty and instructions.

The easy-hard manipulation was effective for both the normal and retarded children on Puzzle 2. There was no interaction of group and difficulty for Puzzle 2. During this puzzle both the normal and retarded children had higher scores in the easy condition and lower scores in the difficult condition. The main effect for difficulty was significant ($F = 1,108 = 17.12$, $p \leq .001$), with a mean score of 4.73 for the easy puzzle and a mean score of 3.45 for the difficult condition. This main effect was also present when an analysis of variance was performed on the puzzles' scores without a bonus for quick completion ($F\ [1,108] = 12.06$, $p < .001$).

On Task 2, the group and instruction two-way interaction is marginally significant ($F = 1,108 = 3.02$, $p \leq .053$). This interaction is represented in Figure 2. It can be seen that the retarded children's scores do not vary greatly. The small variation as is present is contributed by the lower scores in the retarded control condition. In contrast, the normal children in the control condition have the highest score, but probably the greatest contributor to the variance comes from the scores of the normal children in the irrelevant cue condition. Their scores are considerably lower than any of the group scores, including all of the retarded groups' scores.

By comparing the children's scores on Puzzle 1 and Puzzle 2, as seen in Table 3 and Figure 3, it is evident that while there is much variation, there appears to be evidence for a learning effect. On the whole, the control groups performed as expected in that there is an increase in the Puzzle 2 scores over the scores for Puzzle 1.

Both normal control groups increased as did the retarded hard control. There is a slight decrease in the retarded easy control condition.

Looking at the easy puzzle condition for the normal children, the scores for the relevant cue condition increased similar to the control condition. In the irrelevant cue condition, the scores also increased from Puzzle 1 to Puzzle 2, although the increase was not as great in this condition as it was in the control and relevant cue condition.

Looking at the easy puzzle conditions for the retarded children, it is evident that the scores in the relevant cue condition increased over the two tasks, in a manner similar to the normal children. The scores for Puzzle 2 in the retarded easy puzzle relevant cue condition are higher than any other scores. While the retarded children in this condition scored higher than the normal children, it must be noted that the analysis of this data was not significant. In looking across the easy condition, the first time where one finds an instance of a decrease in scores over Task 1 and Task 2 is for the retarded easy irrelevant condition, which one could predict. The scores decreased slightly for the retarded easy control condition, but this decrease is not as great as in the retarded easy irrelevant condition.

Basically, the results for the easy puzzle conditions are to a great extent as expected. However, these tendencies did not result in significant differences.

Investigating the results of the hard puzzle conditions it is evident that the hard puzzles were harder. However, the changes between Puzzle 1 and 2 scores are not consistent. The scores of the normal children in the control condition increase slightly while the other two conditions decreases; the greatest decrease being in the irrelevant cue condition. This decrease appears to be the difference that results in the significant Group by Instructions interaction for the analysis that included puzzle number ($F [2,216] = 3.25$, $p < .05$)(See Figure 4).

For the retarded children in the hard puzzle relevant cue condition, their scores decreased from Puzzle 1 to 11, but this decrease was not as great as the decrease for the normal children in the hard puzzle relevant cue condition. There were increases in scores over the two tasks for the children in the control and the irrelevant cue condition.

Glance Data

Interrater reliability. For 41 of the 120 subjects (34%), two observers were present to score the children's glances. Several methods were used to assess the reliability of the glance measures and the observers. Since the major analyses were concerned with the glancing during the task, the data collected during Task 1 and Task 2 were analyzed. The observers had scored whether a child was looking at the E's task, the E herself or about the room; therefore, each child received 6 scores which resulted in a total of 246 data points. The number of glances ranged from 0 to 12.

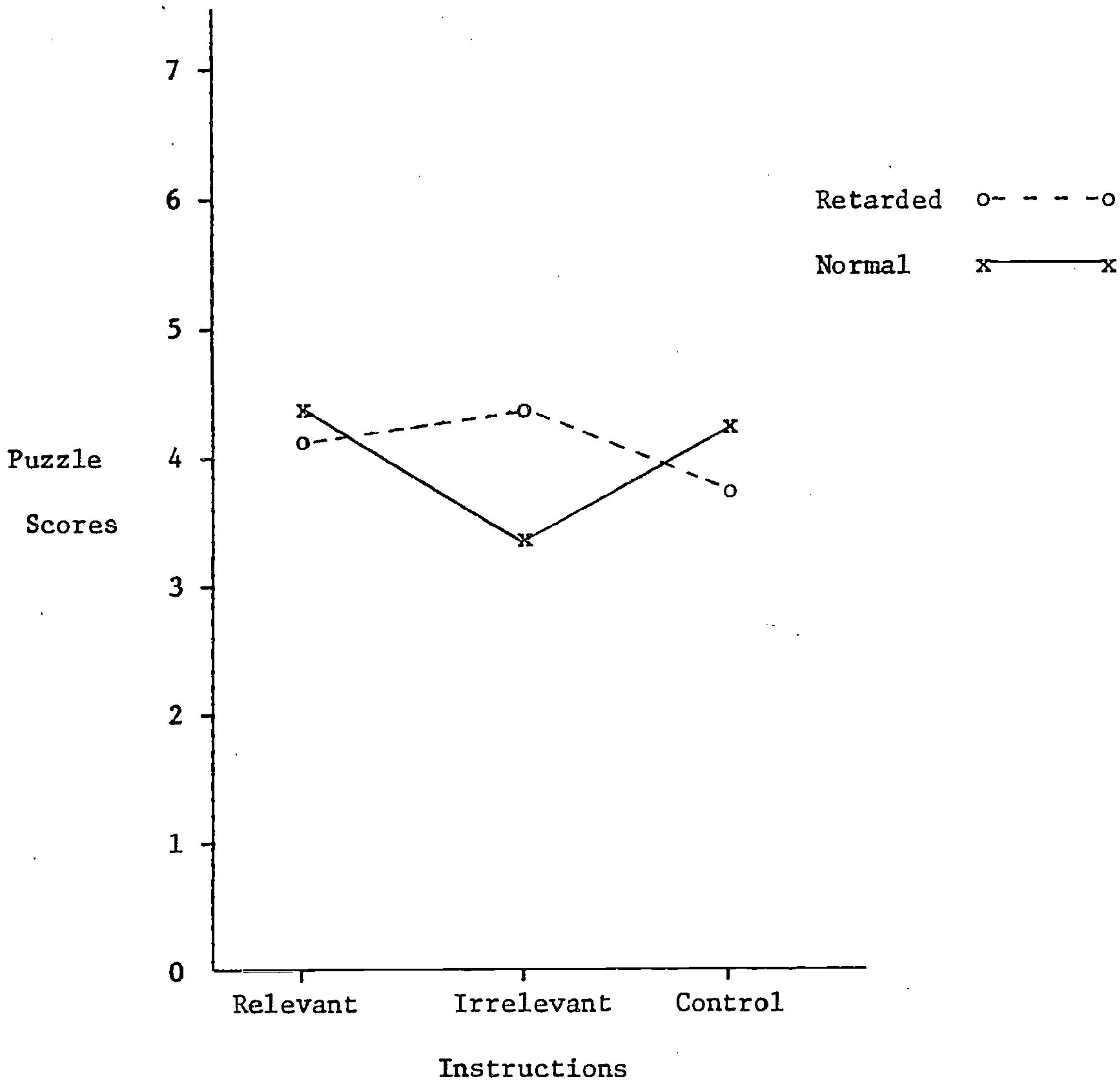

Figure 4. Puzzle 1 to Puzzle 2 change scores for retarded and normal children by instructions.

Out of the 246 data points, the observers agreed 221 times, for a hit rate of .90. For the 25 points of disagreement, the observers disagreed on the number of glances a child made by 1 to 3 glances, with a mean disagreement of 1.36 glances.

The percentage of agreement was also calculated for the 245 instances. The percentage of agreement was 94% and ranged from 0% to 100% agreement. The 0% agreement occurred due to the fact that at 10 points of comparison, one observer scored 1 glance while the other observer did not record a glance. This anomoly results in total disagreement between observers but logically and substantively, the disagreement is relatively slight. When these 10 scores were dropped the percent agreement is 98.

The data does include a large number of instances where both observers did not observe any glances. Since there are statistical difficulties when the data includes a large amount of zeros, the total glance scores were used to find the correlation between the observers' scores. This total was the combined number of times the child looked to either the experimenter, the experimenters' task, or the room during tasks 1 and 2. The correlation for the total glance scores during tasks was .982.

Since it was of interest where the child glanced and not only the more global total score, it was decided to look at the correlation between observers' scores, when at least one observer scored a glance. Therefore, all of the data where both observers recorded no glancing were dropped. The resulting correlation was .92.

Observers also recorded the duration of the glances. The duration of the glances to the experimenter, to the room or to the experimenters' puzzle during Tasks 1 and 2 were analyzed. Again, due to the large number of times both observers recorded no glancing, only the instances in which at least one observer recorded a glance were used. The correlation of this data is .88.

The data was also analyzed by looking at the total duration of glances per child for puzzle 1 and puzzle 2. This data was more highly correlated with r = .98.

The data suggests that the observers reliably recorded the number and duration of glances during the tasks. The correlation between observers was highest when one looks at the totals but it was also very high when the observers differentiated where a child was glancing.

Glancing analyses. The total number of glances made during both tasks was computed by summing the number of glances made to the task, the experimenter and room. A total was also computed in a similar manner for the duration of the glances. The number and duration of total glances made during Task 1 and Task 2 are presented in Table 4. As can be seen in Table 4, the frequency and duration of glances is very low. The total percentage of time spent glancing during both puzzles is only 3.5%. Most of the time spent glancing was during Puzzle 1 (2.5%) while during Puzzle 2 less than 1% of the time did the children glance. The amount of time spent glancing during both tasks for the normal children was 2.0% and the retarded

Table 4

Frequency and Duration of Total Glances

Made During Puzzle 1 and Puzzle 2

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	6.7	4.37	5.2	4.88
Easy Irrelevant	3.2	2.35	2.7	2.31
Easy Control	1.8	1.81	1.5	2.05
Hard Relevant	6.7	7.33	6.2	9.10
Hard Irrelevant	5.4	3.84	3.9	3.05
Hard Control	1.8	1.48	1.4	2.04
Retarded				
Easy Relevant	1.1	1.20	.7	1.10
Easy Irrelevant	4.8	6.61	2.6	3.29
Easy Control	1.4	1.84	1.3	1.60
Hard Relevant	4.9	6.67	4.7	7.44
Hard Irrelevant	3.1	2.69	2.4	2.63
Hard Control	3.1	2.42	2.4	1.85

children spent 1.5%.

An analysis of variance performed on the number of total glances during both tasks revealed a significant main effect for instruction (F [1,108] = 5.04, $p \leq .01$). It is evident that the children in the experimental conditions glanced more than the children in the control condition. A Tukey's post hoc comparison revealed a significantly higher number of glances in the relevant cue condition than in the control condition. The analyses of the total duration scores resulted in similar findings. The main effect of instructions was again significant (F [1,108] = 3.8, $p \leq .05$). The Tukey's post hoc comparison also revealed that the relevant cue condition had a significantly greater duration of total glances than did the control condition.

An analysis of variance was also performed on the total number of glances made only during the first task (see Table 5). Again a significant main effect for instructions was obtained (F [1,108] = 5.50, $p \leq .001$). A Tukey's post hoc comparison revealed that the children in the relevant and irrelevant cue conditions had a significantly greater total number of glances than did the children in the control condition. Additionally, a significant two-way interaction for group by instructions was obtained (F [1,108] = 3.42, $p \leq .05$). As can be seen in Figure 5 the normal children had the greatest number of glances in the relevant cue condition ($\bar{X}$ = 5.4) a moderate amount of glances in the irrelevant cue condition ($\bar{X}$ = 3.2) and a much lower total number of glances in the control condition ($\bar{X}$ = 1.05). The retarded children's total number of glances during Task 1 was

Table 5

Frequency and Duration of Total Glances

During Puzzle 1

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	5.3	4.57	4.4	4.94
Easy Irrelevant	2.1	1.52	1.5	.36
Easy Control	1.3	1.34	1.1	1.32
Hard Relevant	5.5	6.72	5.5	8.54
Hard Irrelevant	4.3	3.68	3.0	2.60
Hard Control	.8	.79	.6	.71
Retarded				
Easy Relevant	.8	.92	.4	.43
Easy Irrelevant	3.5	5.50	2.0	2.97
Easy Control	.9	1.10	.9	1.09
Hard Relevant	3.3	4.60	3.6	6.27
Hard Irrelevant	2.8	2.35	2.1	2.37
Hard Control	2.0	2.00	1.7	1.56

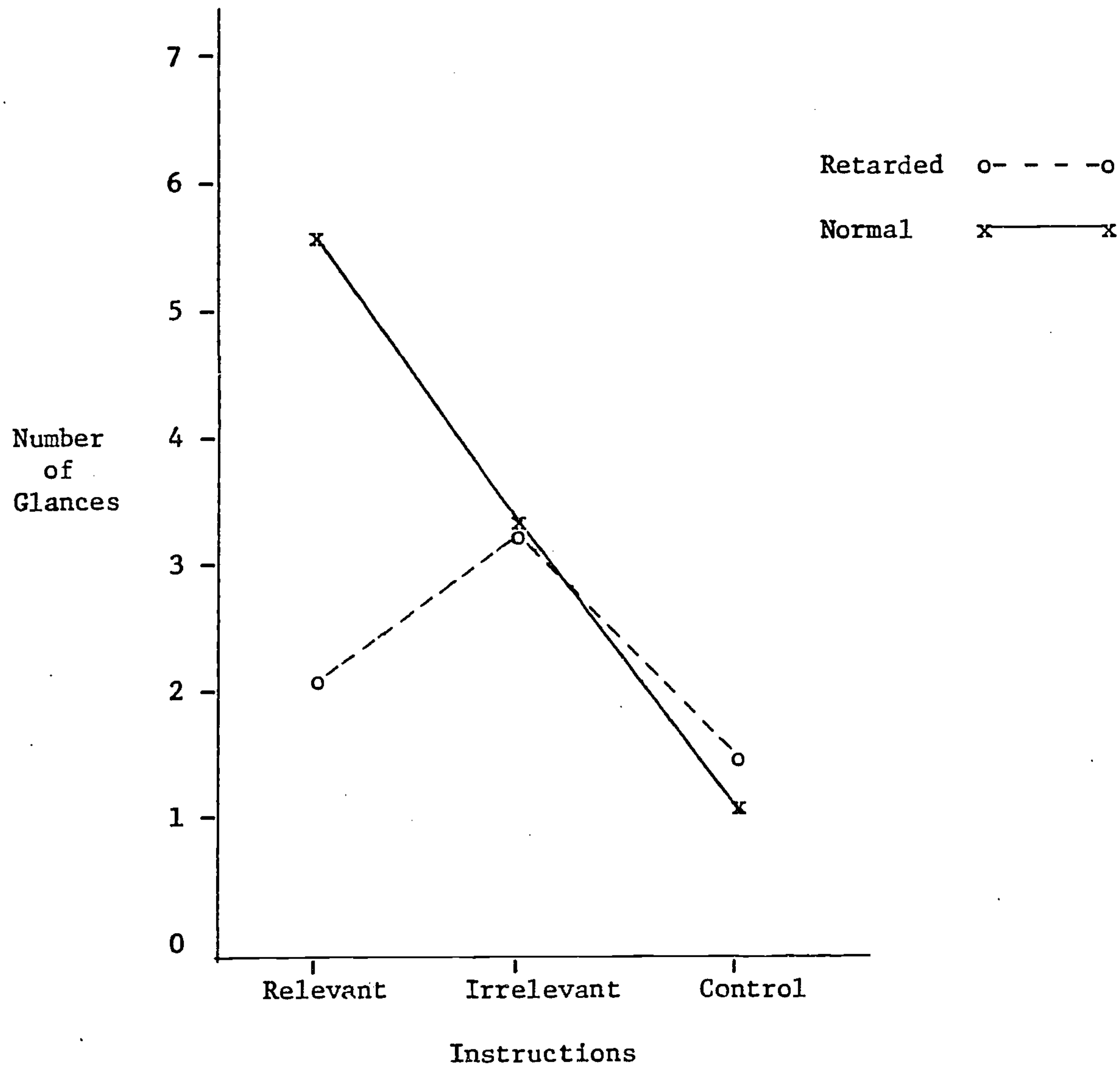

Figure 5. Number of Total Glances During Puzzle 1 for Retarded and Normal Children by Instructions.

very similar to the normal children's total for the irrelevant cue ($\overline{X}$ = 3.15) and control condition ($\overline{X}$ = 1.45). However, it was evident that there is a great discrepancy between the normal and retarded children in the total number of glances for Task 1 in the relevant cue condition. The mean total for the retarded children is 2.05, less than half that of the normal children.

The total duration of glances during Task 1 was also analyzed. The means are presented in Table 5. For this measure the results of the analysis of variance indicated that the main effect of instructions was again significant (F [1,108] = 4.23, $p \leq .05$). A Tukey's post hoc comparison was performed and the relevant cue condition had a significantly higher mean duration of glances ($\overline{X}$ = 3.30) than did the control condition ($\overline{X}$ = 1.13). The irrelevant cue condition with a mean of 2.40 did not differ significantly from the other two conditions. No interactions were significant.

Scores were also computed for both the total frequency and the total duration of glances made during Task 1 that were non-task oriented (i.e., made to the experimenter and the room). An analysis of variances was performed on this data; no significant results were obtained. The number and duration for the total glances during Task 2 were also analyzed. No significant results were obtained by a analysis of variance.

From the results reported above it appears that the children glanced more when there was information available; that is, the experimental groups glanced more than the control groups during Task 1.

The glance measures were also analyzed according to specifically where a child glanced, whether to the room, the experimenter or the task. The mean frequency and duration of glances made to the room during Puzzle 1 is presented in Table 6. An analysis of variance was performed on the frequency of glances and there were no significant effects. A significant main effect for instructions was obtained on the analysis of variance done for the duration of glances made to the room ($F\ [1,108] = 3.77$, $p \leq .05$). A Tukey post hoc comparison revealed that the relevant cue condition's mean duration ($\overline{X} = 1.35$) was significantly higher than the mean for the control group ($\overline{X} = .03$). The irrelevant cue conditions mean ($\overline{X} = .055$) did not differ significantly from either the relevant or control cue condition. No significant results were obtained on an analysis of variance performed on the number or duration of glance made to the room during Task 2.

There were no significant differences between the normal and retarded children in the mean frequency or duration of glances made to the room. It appears that there is no manifestation of greater distractibility by retarded children than by normal children at this mental age in this situation.

Table 7 presents the frequency and duration of glances made to the experimenter during Task 1. An analysis of variance performed on the frequency of glancing to the experimenter resulted in a significant interaction of Group by Difficulty by Instructions ($F = 1,108 = 3.101$, $p \leq .049$). This interaction is plotted in Figure 6

Table 6

Frequency and Duration of Glances to

Room During Puzzle 1

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	2.[illegible]	2.91	2.4	3.74
Easy Irrelevant	.5	.71	.5	.83
Easy Control	.5	1.08	.5	1.0
Hard Relevant	1.3	3.13	1.4	3.71
Hard Irrelevant	1.2	2.25	.9	1.66
Hard Control	.4	.70	.3	.58
Retarded				
Easy Relevant	.2	.42	.1	.17
Easy Irrelevant	.9	1.60	.5	.76
Easy Control	.2	.63	.2	.48
Hard Relevant	1.6	2.07	1.5	2.39
Hard Irrelevant	.6	.84	.4	.59
Hard Control	.4	.70	.3	.49

Table 7

Frequency and Duration of Glances to Experimenter

During Puzzle 1

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	1.3	1.42	.6	.84
Easy Irrelevant	.5	.53	.4	.48
Easy Control	.8	.92	.6	.83
Hard Relevant	.9	1.29	.7	1.52
Hard Irrelevant	1.2	1.23	.6	.65
Hard Control	.4	.52	.3	.49
Retarded				
Easy Relevant	.4	.70	.2	.36
Easy Irrelevant	1.2	2.10	.6	.96
Easy Control	.7	.82	.7	1.04
Hard Relevant	.7	1.57	.7	1.82
Hard Irrelevant	.6	.84	.4	.66
Hard Control	1.6	1.51	1.4	1.40

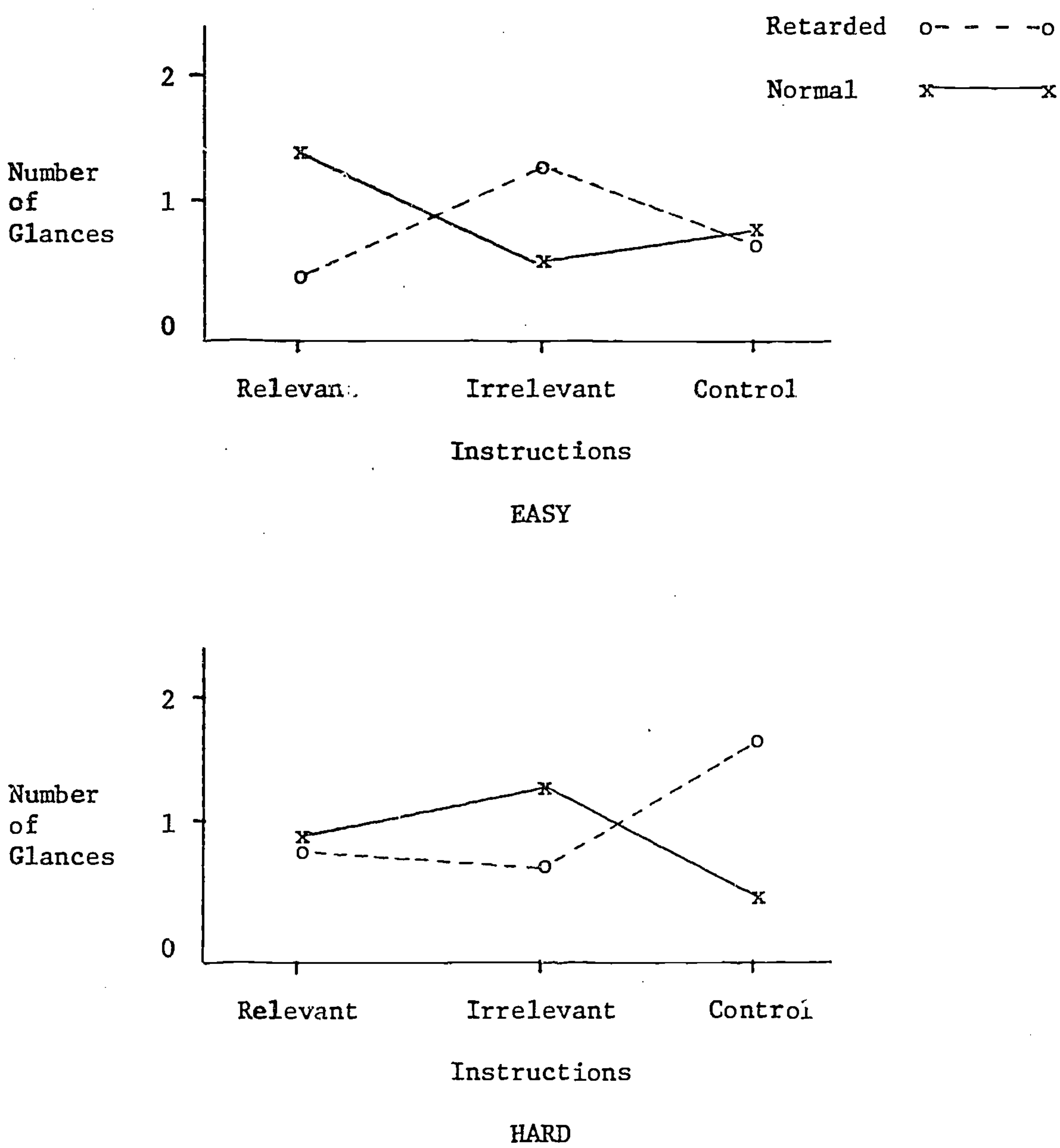

Figure 6. Number of Glances to Experimenter during task 1 for Retarded and Normal Children by task difficulty and instructions.

and it appears that the hard condition is almost a mirror image of the easy condition. No significant results were obtained for the duration of glances made to the experimenter during Task 1 nor for the frequency or duration of glances to the experimenter during Task 2.

The mean number and duration of glances made to the experimenter's task were also analyzed. An issue regarding the definition of a glance to the task must be raised at this point. For the children in the experimental conditions a glance to the experimenter's task was recorded when they glanced in the area of the table where the puzzle was. There was no puzzle for the children in the control condition nor for Task 2. Therefore, in these situations a child could not glance at the experimenters' puzzle and could glance only about the room or to the experimenter. Any glance in this situation that was in the area of the table where the experimenter completed the puzzle for the relevant and irrelevant cue conditions during Task 1 was scored as a glance to the room. Therefore, for control condition children and for all Task 2 conditions, the number of glances to the experimenter's "task" is 0.

The number and duration of glances made to the task during Task 1 is presented in Table 8. An analysis of variance performance on the number of glances reveals a main effect for group (F [1,108] = 6.66, $p \leq .01$). The normal children glanced significantly more ($\overline{X} = 1.38$) than the retarded children (.633). The main effect for instructions was also significant (F [2,108] = 15.34, $p \leq .001$). The

Table 8

Mean Frequency and Duration of Glances

to Task During Puzzle 1

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	2.0	1.83	1.3	1.20
Easy Irrelevant	1.1	1.29	.7	1.05
Easy Control	0	0	0	0
Hard Relevant	3.3	3.16	3.5	4.56
Hard Irrelevant	1.9	1.52	1.5	1.43
Hard Control	0	0	0	0
Retarded				
Easy Relevant	.2	.42	.1	.20
Easy Irrelevant	1.4	2.12	.9	1.66
Easy Control	0	0	0	0
Hard Relevant	1.0	1.33	1.3	2.36
Hard Irrelevant	1.6	1.35	1.2	1.47
Hard Control	0	0	0	0

relevant and irrelevant cue conditions glanced significantly more than did the children in the control conditions, as revealed by the Tukey's post hoc comparison.

More important than the main effects is the significant two-way interaction of Groups and Instructions ($F [2,108] = 6.57$, $p \leq .01$), for the number of glances made to the experimenter's puzzle during Task 1. As can be seen in Figure 7, the normal children glanced most at the experimenter's puzzle under the relevant cue condition ($\overline{X} = 2.65$), a moderate amount in the irrelevant cue condition ($\overline{X} = 1.5$) and of course there were no glances to the task for the control condition. Examining the retarded children's glances, it is evident that they looked at the experimenter's puzzle the same number of times as did the normal children for the irrelevant cue condition ($\overline{X} = 1.5$). Also for both groups of children there were no glances to the task under the control condition. The number of glances made to the experimenter's task by the retarded children in the relevant cue condition is markedly diminished from that of the normal children. The retarded children's average number of glances is 0.5, which is less than one-fifth the number of glances made by the normal children.

The duration of the glances to the task during puzzle 1 was also analyzed. The main effect of difficulty was significant ($F [1, 108] = 5.4$, $p \leq .05$). The duration of glances during the difficult condition ($\overline{X} = 1.24$) was greater than during the easy condition ($\overline{X} = 0.51$). The children looked longer when the task was difficult; the results reached marginal significance for them glancing more

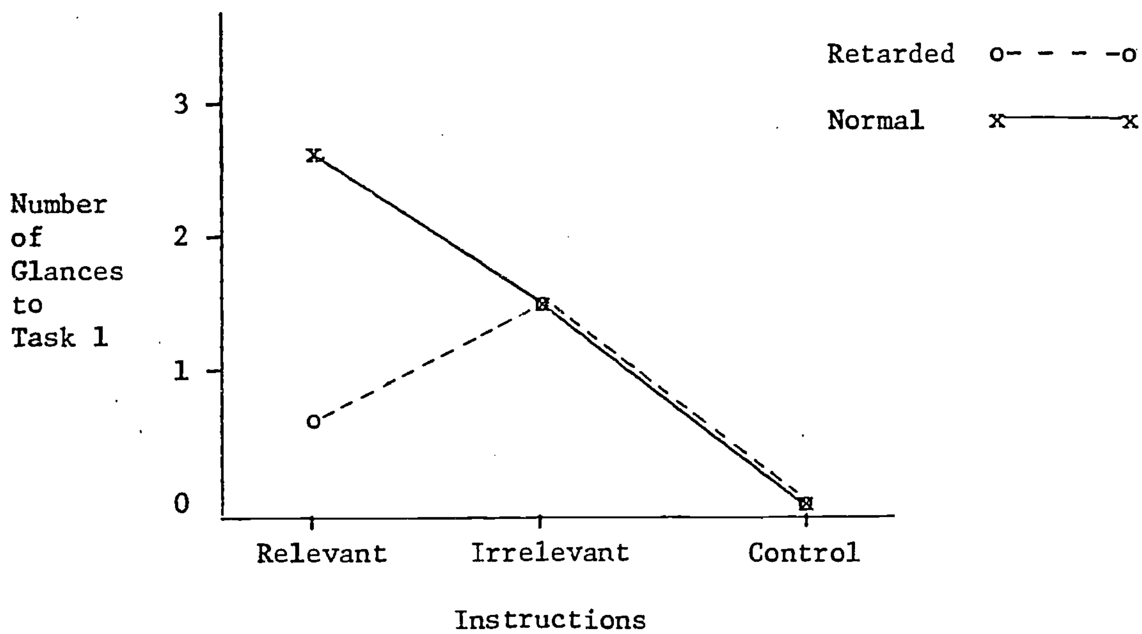

Figure 7. Number of glances made to Task 1 by retarded and normal children by instructions.

often ($F [1,108] = 3.76$, $p = .055$). As with the frequency, the instructions main effect was significant ($F [2,108] = 8.48$, $p \leq .001$); the control group differed from the relevant ($\bar{X} = 1.55$) and irrelevant ($\bar{X} = 1.086$) cue conditions which did not differ significantly by means of a Tukey post hoc comparison.

Again, of interest is the significant two-way interaction of Group and Instructions ($F [2,108] = 3.21$, $p \leq .05$) for the duration of glances to the experimenter's task. As can be seen in Figure 8, the pattern for the duration of glances is very similar to the longest ($\bar{X} = 2.40$) in the relevant cue condition, glanced a moderate amount ($\bar{X} = 1.08$) in the irrelevant cue condition and had a 0 for the control condition. The retarded children again had glancing scores very similar to the normal children's for the irrelevant cue condition ($\bar{X} = 1.09$) and of course for the control condition. One sees again the marked decrease in glancing to the task for the retarded children in the relevant cue condition. Their mean of 0.70 is less than one-third the mean for the normal children. From these results it appears that there was a suppression in glances by the retarded children who received the relevant cue instructions.

As previously mentioned, due to the scoring methods used to measure glances, the control condition had no glances to the experimenter's "task". In order to document that the results were not unduly influenced by a measurement bias, analyses were performed that used the amount of glancing about the room as the data for the control subject's glances to the experimenter's task. It must be high-

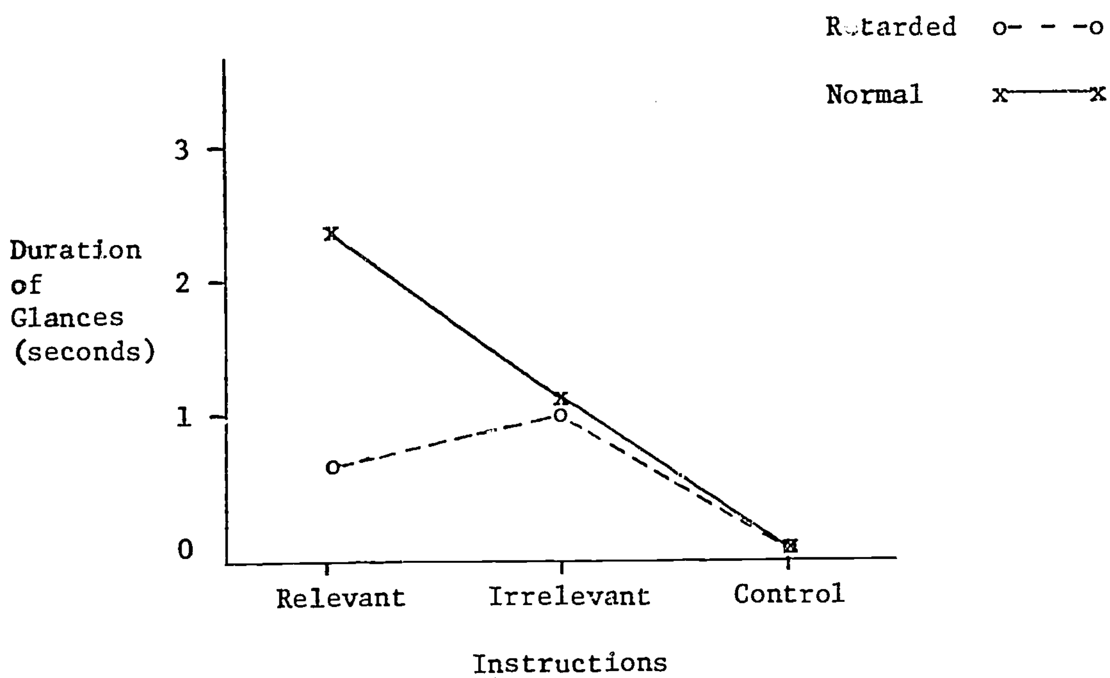

Figure 8. Duration of Glances made to Task 1 for retarded and normal children by instructions.

lighted that the glances about the room should be thought of as the highest possible amount of glancing that could have been directed to the area where the experimenter's task was and is an overestimate. The data used represents all of the glances the children in the control conditions made that were not directed to the experimenter of to their own task. This data is presented in Table 9.

Using this data, an analysis of variance was again performed for the number of glances made to the experimenter's task. This did not change any of the results. Some differences occurred for the analysis of variance performed on the duration of glances. Again, there was a main effect for instruction. However, a Tukey's post hoc comparison revealed that the control condition differed only from the relevant cue condition. The other difference was that the group by instruction interaction did not reach the level if statistical significance. The other results were not changed.

Also of interest were possible differential effects in the amount of glancing at times other than during the tasks. Therefore, several measures were calculated for both the number and duration of glances during the other segments of the experiment. An analysis of variance was performed on these measures [see Tables 10-12 for means]. A main effect for group (F [1,108] = 4.94, $p \leq .05$) was obtained for the total number of glances made during the session with the exception of the tasks; i.e., during the instructions and during the interim after Task 1. A main effect for group was also

Table 9

Frequency and Duration of Glances Made to Experimenter's Task (Room Glances used as Estimate for Control Subjects)

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
<u>Normal</u>				
Easy Relevant	2.0	1.83	1.3	1.20
Easy Irrelevant	1.1	1.29	.7	1.05
Easy Control	.5	1.08	.5	1.0
Hard Relevant	3.3	3.16	3.5	4.56
Hard Irrelevant	1.9	1.52	1.5	1.43
Hard Control	.4	.70	.3	.58
<u>Retarded</u>				
Easy Relevant	.2	.42	.1	.20
Easy Irrelevant	1.4	2.12	.9	1.66
Easy Control	.2	.63	.2	.48
Hard Relevant	1.0	1.33	1.3	2.36
Hard Irrelevant	1.6	1.35	1.2	1.47
Hard Control	.4	.70	.3	.49

Table 10

Frequency and Duration of Total Glances Made During Instructions for Puzzles 1 and 2 and Interim Period After Puzzle 1

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	10.0	4.30	15.9	5.80
Easy Irrelevant	7.7	2.87	14.5	4.81
Easy Control	4.9	2.51	5.0	3.53
Hard Relevant	8.3	4.42	16.5	12.86
Hard Irrelevant	8.7	4.19	13.5	6.19
Hard Control	3.7	3.30	8.6	11.16
Retarded				
Easy Relevant	6.6	3.13	13.1	7.27
Easy Irrelevant	7.6	3.31	12.9	7.01
Easy Control	2.8	2.10	4.1	3.51
Hard Relevant	8.6	4.86	14.6	9.24
Hard Irrelevant	4.9	3.78	9.7	9.89
Hard Control	3.7	4.83	7.3	14.67

Table 11

Frequency and Duration of Total Glances

Made Before Task 1

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	5.5	2.55	6.5	2.20
Easy Irrelevant	4.0	2.36	5.9	4.47
Easy Control	1.3	1.16	1.4	1.92
Hard Relevant	3.6	2.22	5.0	2.68
Hard Irrelevant	4.3	3.09	4.6	3.50
Hard Control	.6	.70	1.0	1.94
Retarded				
Easy Relevant	2.7	2.11	4.5	3.93
Easy Irrelevant	3.6	1.96	5.8	5.45
Easy Control	.6	.70	.5	.57
Hard Relevant	3.5	2.42	4.5	3.55
Hard Irrelevant	2.7	2.06	3.1	2.89
Hard Control	.6	.70	.6	.87

Table 12

Frequency and Duration of Total Glances

Made During the Interim After Task 1

and Instructions for Task 2

	Frequency		Duration	
	Mean	S.D.	Mean	S.D.
Normal				
Easy Relevant	4.5	2.37	9.4	5.19
Easy Irrelevant	3.7	2.50	8.6	4.75
Easy Control	3.6	2.27	3.6	2.03
Hard Relevant	4.7	3.06	11.5	11.60
Hard Irrelevant	4.4	2.72	8.9	6.51
Hard Control	3.1	3.11	7.6	11.32
Retarded				
Easy Relevant	3.9	2.85	8.6	6.42
Easy Irrelevant	4.0	2.45	7.1	4.24
Easy Control	2.2	1.75	3.6	3.41
Hard Relevant	5.1	3.67	10.2	8.25
Hard Irrelevant	2.2	2.15	6.6	8.18
Hard Control	3.1	4.70	6.7	14.09

found for the total number of glances made before Task 1 (F [1,108] = 6.573, $p \leq .01$). These results indicated that the normal children glanced significantly more than the retarded children during all of the non-task segments of the experiment; they also glanced more during the segment of the experiment before Task 1.

Main effects for instructions was also obtained for all of the measures except the total number of glances made after Task 1. Tukey's post hoc comparisons indicated that the control group had significantly less glances (F [2,108] = 16.43, $p \leq .001$) and a shorter total duration of glances (F = 2,108 = 10.87, $p \leq .001$) for all of the non-task segments of the experiment than did the relevant and irrelevant cue groups. The control group also had a significantly lower frequency of glances (F [2,108] = 29.509, $p \leq .001$) and duration of glances (F = 2,108 = 22,891, $p \leq .001$) than the relevant and irrelevant cue conditions for the instructions before Task 1. Finally, the control group had a significantly shorter duration of glances made between Task 1 and Task 2 than did the relevant cue group (F = 2,108 = 3.230, $p \leq .05$).

Pearson product moment coefficients were calcualted to obtain a measure of the relationship between glance measures and learning as represented by the puzzle scores. The correlations were obtained for each of the twelve groups. The correlations were computed for puzzle 1 and puzzle 2 scores with the total frequency and duration of glances during Task 1; the totals for task 1 and 2 combined; as well as the frequency and duration of glances to the task for Puzzle 1. The design and hypotheses of the study suggest that certain correlations should be negative and certain be positive. For instance, subjects in the relevant cue conditions who glanced at the experimenter's puzzle could have impaired their performance on puzzle 1, which would result in a negative correlation. However, if information was acquired, this would increase their performance on puzzle 2 and this would result in a positive correlation. Twenty of the 120 correlations were significant, all but three of these were negative. (See Table 13)

Due to the small sample size ($N = 10$) the individual subjects' scores were plotted. It appeared that one or two children's scores varied dramatically from their group's, and that the obtained correlation was not truly reflective of the group's patterns.

There were 4 children whose scores were extreme and were therefore dropped from a subsequent analyses. These subjects were selected after visual inspection of graphs of individual subjects' scores. For example, these children's number of glances to Task 1 were up to 5.6 points about the mean and their puzzle 2 scores were up to 5 points below the mean. Two of the children were in Normal Easy Relevant condition, one was in the Normal Easy Irrelevant and one was in the Retarded Easy Irrelevant condition. Without these 4 subjects the correlations changed rather dramatically. There were no significant correlations for any of the normal subject conditions and only five significant for the retarded subject condition (See Table 14).

These radical shifts by the selective removal of a few subjects

Table 13

Significant Correlations Between Puzzle Scores and Glancing by Groups

		Correlation	Significance
Retarded Easy Relevant			
Puzzle 1:	number of glances to Task 1	.53	.043
	duration of glances to Task 1	.56	.048
Retarded Easy Irrelevant			
Puzzle 1:	number of glances to Task 1	-.74	.007
	duration of glances to Task 1	-.73	.009
	number total glances Task 1	-.78	.004
	duration total glances Task 1	-.76	.006
	number total glances	-.80	.003
	duration total glances	-.85	.001
Puzzle 2:	number of glances to Task 1	-.69	.013
	duration of glances to Task 1	-.67	.016
	number of total glances during Task 1	-.77	.004
	duration of total glances during Task 1	-.76	.005
	number total glances	-.78	.004
	duration total glances	-.82	.002
Normal Easy Relevant			
Puzzle 1:	number of glances to Task 1	-.74	.007
	duration of glances to Task 1	-.56	.046
Puzzle 2:	duration of glances to Task 1	.59	.038
Normal Easy Irrelevant			
Puzzle 1:	number total glances	-.65	.022
	duration total glances	-.61	.030
Normal Hard Irrelevant			
Puzzle 1:	number total glances during Task 1	-.57	.043

Table 14

Significant Correlations Between Puzzle Scores and Glancing by Group Without Outlaying Subjects

		Correlation	Significance
Retarded Easy Relevant			
Puzzle 1:	number of glances to Task 1	.57 (10)	.043
	duration of glances to Task 1	.56 (10)	.048
Retarded Easy Irrelevant			
Puzzle 1:	number total glances during Task 1	-.65 (9)	.029
Puzzle 2:	number total glances during Task 1	-.67 (9)	.024
	duration total glances during Task 1	-.62 (9)	.037

reflects the statistical properties of low N correlations. A few subjects who are outlayers can dramatically change the mean tendencies and therefore the correlation between scores. It appears that the number of subjects per cell was not large enough to adequately test the relationship between glance measures and learning.

As a post-hoc measure, to further investigate the relationship between learning and glancing measures, the variable of instructions was collapsed over and therefore the subjects were combined by group and puzzles difficulty. This results in 30 subjects per cell. Pearson product moment coefficients were again computed and the significant correlations are presented in Table 15. It is evident that the results from the combined groups present a somewhat diffe[illegible]nt pattern of the relationship than did the other two analyses. The majority of the significant correlations are from the retarded subjects who had easy puzzles. These are mainly negative correlations between glancing and performance on the second puzzle. Looking at the correlations in Table 13 for each individual group, the majority of correlations are for the Retarded subjects in the Easy puzzle and irrelevant cue condition; these correlations were also negative but for both Puzzle 1 and Puzzle 2.

The other correlations that were significant for the groups by difficulty combinations were also negative. These were mainly correlations between glances during Puzzle 1 and performance on Puzzle 1 and glances during Puzzle 2 with the performance on Puzzle 2. The only exception was for the normal children who completed

Table 15

Significant Correlations Between Puzzle Scores

and Glancing for Group and Difficulty

		Correlation	Significance
Normal Easy Puzzles			
Puzzle 1:	number glances to Task 1	-.54	.001
	duration glances to Task 1	-.42	.011
	number total glances during Task 1	-.36	.027
	duration total glances during Task 1	-.35	.029
Puzzle 2:	number total glances during Task 2	-.49	.003
	duration total glances during Task 2	-.43	.009
Normal Hard Puzzles			
Puzzle 2:	number total glances	-.32	.043
Retarded Easy Puzzles			
Puzzle 1:	duration total glances during Task 1	-.40	.015
	duration total glances	-.37	.021
Puzzle 2:	number glances to Task 1	-.41	.011
	duration glances to Task 1	-.42	.010
	number total glances during Task 1	-.50	.003
	duration total glances during Task 1	-.55	.001
	number total glances during Task 2	-.43	.009
	number total glances	-.53	.001
	duration total glances	-.56	.001
Retarded Hard Puzzles			
Puzzle 2:	number total glances during Task 2	-.32	.044

the hard puzzle. In those conditions the number of total glances correlated negatively with their performance on Puzzle 2.

Estimates of child's cognitive ability. Both the experimenter and the observers estimated the subjects' cognitive ability at the end of the session. A 5-point scale had been used that included: low (1), low average, (2), average (3), above average (4), and high (5). An analysis of variance (Group X Instructions X Difficulty) were performed on the experimenters and observers estimates. Significant main effects for group were obtained for the experimenter's estimate (F [1,108] = 11.406, $p \leq .001$), as well as for the observers estimate (F [1,108] = 20.994, $p \leq .001$). In both instances the retarded children were rated as lower in cognitive ability. (See Table 16)

One of the observers was an advanced graduate student in a field of child psychology, a second person had a retarded sibling living at home and the other two observers had previously had very limited exposure to any children. Therefore, a comparison of the accuracy of the various observers was made. Two by two tables were constructed for the number of accurate classifications and misses for the retarded and the normal children. Low was considered to be low and low average; these were the accurate classifications for the retarded children. High was average, above average and high; these were the accurate classifications for the normal children. Chi squares were computed for each observer. These were significant for three observers (See Table 17). [Naive[1] X^2 (DF = 1,4.3856, $p \leq .05$);

Table 16

Experimenters and Observers Estimate of

Child's Cognitive Ability

	Experimenters		Observers	
	Mean	S.D.	Mean	S.D.
<u>Normal</u>				
Easy Relevant	3.1	.74	3.1	.88
Easy Irrelevant	2.6	.97	2.7	.68
Easy Control	3.0	.82	3.5	1.08
Hard Relevant	3.4	1.08	3.4	.97
Hard Irrelevant	3.0	.82	3.6	.84
Hard Control	3.1	.57	3.5	.71
<u>Retarded</u>				
Easy Relevant	2.2	.79	2.6	.97
Easy Irrelevant	2.8	1.03	2.8	.92
Easy Control	2.4	.97	2.5	1.35
Hard Relevant	2.6	.70	2.1	.57
Hard Irrelevant	2.7	1.06	2.9	.99
Hard Control	2.3	.68	2.2	1.03

Table 17

Accurate Classifications and Misses for Children's

Cognitive Classification by Experimenters

Naive

	Cognitive Ability: Low	Cognitive Ability: High
Normal	7	36
Retarded	13	19

Naive

	Low	High
Normal	6	24
Retarded	20	22

Experienced Graduate Student

	Low	High
Normal	6	11
Retarded	19	0

Retarded Sibling at Home

	Low	High
Normal	8	22
Retarded	14	17

Naive[2] X^2 (DF = 1,5.5231, $p \leq .05$); Experienced, X^2 (DF = 1,14.7854, $p \leq .01$)]. For the observer who had a retarded sibling at home the chi square was non-significant. However, it is obvious that all observers made many misclassifications.

DISCUSSION

Certain effects are considered to be of particular theoretical interest in light of long standing research in outerdirectedness. However, some ambiguity has emerged over the years in terms of such issues as the nature of outerdirectedness with EMR children, success-failure manipulations and the role of task difficulty. Although there were a number of interesting findings from the present experiment, the results did not conclusively resolve the issues. Whereas the present findings appear to raise more questions than they answer, it is hoped that they may in the future contribute to more informed experimentation on the issues.

In regard to the puzzle scores, it is clear from the results of the multiple analysis of variance and the analysis of variance that the easy-hard manipulation had effects. However, due to the finding of an almost significant group X difficulty interaction, some doubt is case on the main effect for difficulty during Puzzle 1. There appears to be a differential effect on the easy-hard manipulation while the normal children's scores remain relatively constant. This may be due to the inclusion of a bonus for quick completion that may have affected the retarded children's scores. When the scores were analyzed without a time bonus, there was no effect for difficulty. For Puzzle 2, the results are more consistent with both normal and retarded children scoring higher on the easier puzzles.

The conditions involving the easy puzzle groups produced a pattern of results in accordance with expectations. However, the results were not statistically significant, and therefore cannot be considered to verify the theory. Looking at the normal children's scores on Puzzle 1 and Puzzle 2, the greatest increase was made in the relevant cue condition, with only a slight increase for the irrelevant cue condition. The greatest increase in scores between Puzzles 1 and 2 is for the retarded children in the relevant cue condition, this is also the highest score for all conditions. While this finding is according to prediction, it is unfortunately not statistically significant. For the retarded children in the irrelevant easy puzzle condition there is a decrease in their performance over puzzles. These children observed the experimenter complete a puzzle that was different than the puzzles they completed and this may have somewhat hampered their performance.

While these results are interpretable, the results for the hard puzzles conditions remain somewhat mysterious and contradictory. For the control conditions there is a slight increase over the two tasks, indicative of a standard learning effect. However, there were not consistent results for the experimental conditions involving the hard puzzles: Both relevant cue groups decreased from Puzzle 1 to Puzzle 2, contrary to expectations; meanwhile, the MR irrelevant group <u>increased</u> as the Normal irrelevant groups <u>decreased</u>, which seems the reverse of intuition as well as theory! The results demonstrated that the dynamics of the situation were somehow affected by the instructions or the experimenter completing a puzzle.

More consistent and interpretable results were obtained for the glancing measures. First, it is evident that during the time the puzzles were present, the normal and retarded children were non-task oriented for a very small percentage of the time (3.5%). Similar low off-task behavior has been reported by Turnure (1973). It was also found that ch' 'ren glanced significantly more often when information was available. During Task 1, the children in the relevant and irrelevant cue conditions had a significantly greater total number of glances than did the children in the control condition. Also the children in the relevant and irrelevant cue conditions had a greater duration and frequency of glancing during the instructions for Task 1. Additionally, there were no significant differences between retarded and normal children for how often they looked about the room. Therefore, it appears that there is no manifestation of greater distractibility by retarded children than by normal children of this MA. These findings also support the interpretation that glancing, or outerdirectedness, is an information-seeking s' ategy. This interpretation is also supported by the finding that during Task 1 the children glanced longer at the experimenter's puzzle for the difficult puzzle than for the easy puzzle.

The predictions regarding the amount of glancing varying according to the type of cues available were supported by the normal children. Looking at the total number of glances the normal children made during Task 1, when the manipulation occurred, it is evident they glanced the most when the experimenter was working on the puzzle they knew they would do next. A moderate amount of glancing was done in the irrelevant cue condition where the children knew the puzzle the experimenter was working on was one they would not complete. Very little glancing was done during the control condition at which time the experimenter was not completing a puzzle.

The retarded children demonstrated a similar pattern of glancing as the normal children for the irrelevant cue and control conditions. However, there is a great discrepancy between the retarded and normal children's glancing during the relevant cue condition for Task 1. The retarded children glanced less than half as much as did the normal children.

This finding can be better understood by looking at the results for the glance measures that are broken down into where specifically the child was glancing; at the experimenter, at the experimenter's task, or about the room. An interpretable difference for the children's performance according to experimental manipulation is found for the number and duration of glances made to the experimenter's puzzle. Here the pattern of normal and retarded children's glances is very similar to their pattern for total glances during Task 1. Again, there is the similar performance by the retarded and normal children for the irrelevant and control condition. Also there is the marked discrepancy between the two groups for the relevant cue condition; the normal children glanced five times more often than the retarded children and the normal children glanced three times longer than the retarded children.

It appears that this decrease in glancing can be viewed as a suppression by the retarded children of their glancing to the experimenter's task. This decrease is found only in regard to the experimenter's task and only for the condition in which the children were told that they would do the puzzle the experimenter was working on as their second puzzle. This finding is contrary to prediction; it was hypothesized that the retarded children would glance most in this condition. These results indicate that the behavioral indices of the outerdirected mechanism can be suppressed for those children whose MA is not increasing at the normal rate. The answer remains speculative as to why these children suppressed their glancing. It may be due to some dynamics of their general deficit and/or due to their socialization history. The children may have viewed the situation as condescending in that they were required to do the same puzzle the experimenter had already completed. They may have wanted to demonstrate their ability to do it themselves without help. This may have been a resistance to receiving direct help.

Another possibility is that their socialization history at school may have influenced their performance. Achenbach and Zigler (1968) found that a class of retarded children whose teacher stressed and rewarded the strategy of "figuring things out for yourself" behaved differently than other retarded subjects and normal subjects. Teachers and the educational system often stress to a child to do his own work, to keep his eyes on his own paper. It is possible that this behavior was evident mainly in the retarded children because they had been in the school system much longer than the younger, normal children. While this behavior is appropriate at times, this suppression of looking for cues to guide one's actions can be unfortunate in some instances and could be viewed as maladaptive in others. Even though helpful cues were available and the task was difficult, some children did not look for help and seemed to actually suppress their glances to the area where information was available. It appears that this could be interpreted as an instance of socialization transcending adaptation. This emphasizes the importance of Farnham-Diggory's (1972) appeal to do further research in this field. The area is even more complex since the child cannot only decide to glance but also decide not to glance, even though it would be in his best interest to get more information.

In this study, the relationship between learning and outerdirectedness was investigated. Although this relationship is critical, the marginal nature of the reported correlations and the ease with which they could be disturbed points out a problem area in this field of research. This difficulty arises not only because of the small number of subjects per cell. One needs to also look at the measures used to study the nature and magnitude of the hypothesized relationships. An issue arises regarding the measurement of outerdirectedness by the behavioral indices of glancing. It is readily apparent that glancing is a valid and direct measure of outerdirectedness. Furthermore, the refinement of the measurement of glancing used in this study to delineate where a child was glancing proved to be reliable and provided valuable information. However, some intriguing and important issues regarding the use of glancing remain unanswerable.

Outerdirectedness is viewed as an information-seeking strategy. When glancing is used as the behavioral indicator of outerdirectedness information can be obtained regarding where a child is orienting. However, it is unknown what type of cognitive processing the child is doing at that time. One does not know if the child is passively observing or actively learning. This is a real concern not only for laboratory investigations but also for educators. Jackson (1968), in regard to children learning in school states "In addition to merely being there the participants must attend in a more profound fashion... in short they must become involved in their work" (p 85). However, the behavioral indices that indicate when someone is paying attention are ambiguous, and attention itself can be a very fleeting and transient state.

The results from both the puzzle scores and glance measures indicate that the conditions that unequivocally expose the existence or nonexistence of outerdirected tendencies have not been identified. It is important to accept the fact that there is much variability within the data. Subject's tendencies are being investigated and since these cannot be structly manipulated, there is much variability within the data. In the future, it will be important to have some studies with very large sample sizes to help systematize the variability. Another important extension of the research would be to get at more direct processing indicators by use of individual subjects and neurophysics to investigate in depth the information processing mechanisms.

As an additional measure during the experiment, the observers and experimenters were required to estimate each child's cognitive level on a five point scale. These people did not know that half of the subjects were retarded. The child was rated at the end of the session so the observers did have some information as to how the child functioned. The observers, on the whole, were able to differentiate between retarded and non-retarded children. However, as the results demonstrate, the observers were often inaccurate and rated normal children as below average and retarded children as average.

It is interesting to note the pattern of the ratings made by the experienced graduate student. While she successfully classified the retarded children, she misclassified over one-third of the normal children. It is speculated that she realized that the experiment was designed with retarded children as a major group of subjects; she then had somewhat of a bias to rate children low when she had some question of their ability.

The observers rated the children after they performed the experimental tasks. It would be informative in future research to have the observers rate the child solely on an initial impression and then rate the child again after he/she had completed the experimental task.

The results of the present study tend to support the general theory of outerdirectedness in that the children glanced more when information was available and they looked longer on difficult tasks. The normal children glanced most in the relevant cue condition, a moderate amount in the irrelevant cue condition, and very little glancing was observed during the control condition. However, it was not found that the retarded children were more outerdirected than their MA matched normal peers. During the irrelevant and control conditions there were approximately equivalent amounts of glancing by the normal and retarded children. However, other than finding heightened glancing during the relevant cue condition, a suppression of glances was found for the retarded children.

It is of interest to compare and contrast the present study with other studies of outerdirectedness, in particular the original study of outerdirectedness by Turnure and Zigler (1964). The present study was similar to Turnure and Zigler's study but was not a replication and varied in design and methodology. First, the children in this study received different instructions. The children in the experimental conditions knew ahead of time whether they would assemble the same puzzle the experimenter assembled or a different one. In Turnure and Zigler's study the experimenter completed the puzzle without telling the child that he would have to complete a second puzzle. Also, in regard to the puzzles, the variable of easy and difficult puzzles was introduced in the present study. The puzzles used for the easy condition were the same as used by Turnure and Zigler; however, the difficult puzzles were new.

Methodologically, there are several differences between the two studies. All of the subjects in the present study were obtained from regular elementary schools; the retarded children had contact with normal children for at least part of the day. In Turnure and Zigler's study the retarded children were residents of a Training School. The differences between institutionalized and noninstitutionalized retarded children have often been discussed (See Zigler, 1966) and these differences may be crucial here. Other researchers in outer-directedness have used noninstitutionalized EMR children as subjects and the research has been equivocal (Massari & Mansfield, 1973; Gordon & MacLean, 1977).

One difference that may be especially relevant to this study is the type of educational programming that occurs in these two different environments. At many institutions the emphasis is often on self-help skills and performance type tasks rather on verbal or academic skills. The staff often stresses that the children imitate the behavior of others and observational learning and manual guidance are often the prevalent modes of instruction. On the other hand, in a mainstreamed environment the retarded children are immersed in a more traditional educational system approach. There is a much greater stress on academic materials and the approach to teaching is often verbal. The children are encouraged to do their own work and looking at someone else, or especially looking to someone else's work, is usually frowned upon and often considered cheating.

Not only were the subjects in these two studies in different educational programs, but it must also be considered that Turnure and Zigler's data were collected at least 16 years earlier than the present data. During this time the American educational system has undergone many changes. The system has changed as well as teaching strategies, materials, and even the philosophy of education in general, and of particular concern here, the philosophy of Special Education. These differences may have in many ways changed the experiences that the children have received and make it somewhat difficult to compare the two groups. Similar changes over time are investigated in the area of life-span developmental psychology (e.g., Nesselroade & Reese, 1973). Research in this area is concerned with cohort effects which consider the impact that environmental and sociocultural change may have on development.

The method of subject selection for the present study also varied from that used by Turnure and Zigler. In the present study, the children were selected and matched according to their performance on the WISC-R block design task, whereas Turnure and Zigler matched their subjects by their IQ scores, which were obtained on the Stanford-Binet. These latter subjects were selected according to their general intellectual functioning, rather than on their specific puzzle-solving skills as done in the present study. The retarded children in this study had a CA of 11.7 and their test age on the block design was 7.8. Turnure and Zigler's retarded children had a CA of 13.55 and an MA of 7.4. Therefore, it appears that the retarded subjects in Turnure and Zigler's study were more retarded than the subjects in the present study.

The characteristics of the normal subjects also differed. In the present study, the normal children had a CA of 7.9 and a test age of approximately 7.8 on the block design task. In Turnure and

Zigler's study, a CA of 6.2, an MA of 7.4 and relatively high IQ's. Therefore, these students were brighter but younger than the normal children used in this study.

Another difference between the two studies is in terms of the physical setting. The children in the present study were watched by one or two observers who were seated in front of them. Turnure and Zigler used only an experimenter who also recorded the number of glances. It is possible that the addition of observers influenced the glancing behavior of the children.

It is possible that Turnure and Zigler's conceptualization of outerdirectedness may not be robust enough to encompass these different factors that may influence where and when children look for information. Additionally, the design of the present study may be viewed as having resulted in an effect that was more powerful in this situation for the retarded children than outerdirectedness. Explicitly telling the retarded children that they would do the experimenter's puzzle next resulted in a suppression of their glancing. One could interpret this finding as an instance of socialization transcending adaptation.

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STUDY II

In order to investigate how research in outerdirectedness could become more directly related to the classroom situation, a second study was carried out. Previous research had demonstrated that children did look for and use cues gained from adult experimenters as well as machines (e.g., Achenbach & Zigler, 1968 and Turnure, Larsen, & Thurlow, 1976). However, these sources of information are limited in a normal classroom; there are seldom teaching machines in classrooms and the amount of time a teacher or other adult can spend individually with each pupil is limited. However, children are usually in close contact or proximity to other children in the class. It appears important to investigate whether peers could be used as information agents.

This concept appears to be particularly germane in the field of mental retardation, due to the mainstreaming movement. This philosophy believes that mentally retarded children can benefit, both academically and socially, from exposure to children with average abilities. It seems important to investigate whether EMR children could or do look to their more capable peers for information and whether they are able to utilize this information.

Also of importance is the issue of how conducive to outerdirectedness are the materials that are used daily in classrooms, such as worksheets. Finally of interest is, whether cues must be direct before children will look to their peers for information.

METHODS

Experimental Design

Retarded children were paired with normal peer models and completed a worksheet under one of three instructions conditions--explicit, general, or control. Each child did a form of the worksheet first separately, then next to the peer, and finally separately again. A second control group consisted of five retarded children who worked alone.

Subjects

The subjects were 35 retarded children who attended urban public elementary schools and represented a wide range of SES backgrounds. These children were mainstreamed in intermediate classes which correspond to the fourth to sixth grades. Eighteen of the subjects had earlier participated in Study I. These subjects were assigned so as to constitute half of each experimental condition.

Children of average or better intelligence were used as peer models. These children were paired with a retarded child to whom they were familiar. These normal children were selected by their teachers as having performed well in school.

Materials

Worksheets that consisted of pictures of coins were used, and the children were required to know the value of the coins. Pretesting was carried out to assure that the worksheets were of average difficulty for this population. All children had been exposed in class to similar types of worksheets.

Three forms of the worksheets were constructed. All three forms had the same problems but in different order. See Appendix B for a sample worksheet.

As in study I, glancing behavior was recorded by means of a Rustrak Event Recorder. The observers pressed the switch button that activated Pen 1 when the subject looked to the peer model, Pen 2 when the child looked at the peer model's worksheet, and pen 3 was activated when the subject looked about the room. The observers recorded the subject's glancing behavior during the three sets of instructions and while the child was completing the three sets of worksheets.

Procedure

The peer model was first brought to the experimental room in the child's school by the principal investigator. She/he was shown a copy of the worksheet and was asked to verbally solve some of the problems. No peer model had more than minor difficulty, with only an occasional miss. The model was praised and then told that the experimenters were working with children and wanted the model to do the worksheet with another child. The model was then told:

> You really know your money. I don't know if __________ will know it as well as you. I want you and __________ to work at the same speed. If you see that you are going faster than __________, I want you to slow down. I want you and __________ to turn the pages at the same time. Do you understand? OK. Also, you know how sometimes it is OK to look at your neighbor's paper and sometimes it is not? Well, today in here it is OK. If your partner looks at your paper or if you look at his, it is alright. Any questions?

The subject was then brought into the room and introduced to everyone. The experimenter then gave the following instructions:

> "We want to find out more about how children learn. What we are doing today is seeing if it matters where a child sits. So what I want to do is have you do some worksheets while you are in different seating arrangements. OK. First ____________ you sit here, and ____________ you sit there.

The children were directed to seats that were far apart from each other and placed so that it would be difficult for the children to see each other's answers. The experimenter then continued: "OK. Here is the worksheet. Let's look at the instructions." The experimenter read the directions out loud from the children's worksheets and made sure each child knew what to do for all of the pages. The experimenter then said, "Any questions? OK, begin."

The experimenter then began timing the subjects. When both children finished or after a four minute time limit, the experimenter said, "Good work. OK, let's try something else. ____________ you here and ____________ you sit there." The children were placed side by side at a table. The experimenter then gave the following instructions depending upon the condition the child was in:

> Explicit Instructions: Now I want you both to complete this worksheet and try to get as many right as you can. If you don't know an answer, you can quietly look at your partner's paper. Here is the worksheet that I want you to do.

> General Instructions: Now I want you both to complete this worksheet and try to get as many right as you can. Here is the worksheet that I want you both to do.

> Control Instructions: I have some worksheets that I want you to do. These two are different. ____________ (Subject's name) I will give you this one, and ____________ (other child) you will do this one. Here are the worksheets that I want you to do.

All children were then asked if they had any questions. The experimenter then said "Go ahead" and began timing both children.

Again at the end of four minutes or whenever both children were finished, the experimenter stopped them and said:

"Now, for the last time I want ____________ to sit here and ________________ to sit here." The children were again separated and were seated so that they had switched positions from the first time. When both children had finished, or at the end of four minutes, the experimenter said, "Fine, you both did good work."

For the children in the alone condition the experimenter simply had the child sit in three different chairs.

At the end of the session the experimenter allowed the children to pick one puzzle to complete and when they were finished they were escorted back to their rooms by the principal investigator.

RESULTS

Since half of the subjects had also been involved in Study I, t tests were performed to establish whether these subjects significantly differed from the new subjects. T tests were computed for the time it took to complete each worksheet and the number of errors made on each worksheet. No significant differences were obtained. Glance data was also analyzed, there were no significant differences between the two groups for the number of glances made to the partner's paper during Task 1, 2 or 3 or for the number of total glances made during Task 1, 2, or 3. Therefore, all subsequent analyses were performed combining the two groups of subjects.

A multiple analysis of variance was also performed on the time it took the subjects to complete each worksheet, however this was not significant (See Table 19). An individual analysis of variance was performed for each separate worksheet. No significant results were obtained. Due to the nature of the data a logorithmic transformation was performed on the data (log 10 transformation). Analyses were then performed; there were no statistically significant results.

In the explicit and general instructions conditions the children were told to "try to get as many right as you can.", while this statement was omitted from the instructions for the control and alone

Table 18

Errors Made on Worksheets

	N	Worksheet 1		Worksheet 2		Worksheet 3	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Explicit	10	8.2	9.18	7.8	9.53	7.2	9.81
General	10	7.3	8.82	5.3	9.01	5.9	9.45
Control	10	11.9	10.28	11.9	11.65	9.9	11.28
Alone	5	9.8	9.39	6.2	8.98	5.8	8.70

Table 19

Time Required to Complete Each Worksheet

	N	Worksheet 1		Worksheet 2		Worksheet 3	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Explicit	10	188.9	35.33	179.8	38.55	161.3	40.23
General	10	215.2	35.20	190.2	53.42	176.1	59.06
Control	10	224.2	24.81	210.7	36.06	190.4	38.58
Alone	5	220.0	44.72	204.6	51.68	199.4	46.64

conditions. Therefore, the explicit and general instructions groups combined were considered to be the exhortative instructions group and the control and alone conditions combined were considered to be the neutral instructions group. An analysis of variance was performed on the number of errors made on each worksheet and the time taken to complete each worksheet. In addition a multiple analysis of variance was performed for the errors and time. None of these analyses yielded statistically significant results.

Glance Data

Interrater reliability. As in Study I, interrater information was obtained. For 11 of the 35 children (31%) two observers were present to score the children's glances. The data collected during the three tasks were ... in ... the observers recorded whether the child was looking at the peer model, at the model's task or about the room, each child received 9 scores which results in 99 data points.

The percentage of agreement between observers for the 99 instances was 73% for the frequency of glancing. As in Study I, there were many instances where one observer scored one glance while the other observer did not record a glance. While this results in total disagreement, it is felt that the difference is relatively slight. Therefore the 15 instances were dropped and the subsequent percent agreement between observers was 86%.

Again due to the large number of instances when both observers recorded no glances, the number of glances the child made during the tasks were analyzed for the instances in which at least one observer scored a glance. The correlation between observers for this measure was .46. When the glances were combined for each task by summing the number made to the peer model, to the model's task or to the room the correlation between observers was .995.

The duration of the glances was also recorded and the duration of the glances to the model, to the model's task or to the room during the task were totaled for the instances in which at least one observer recorded a glance. The resulting correlation between observers was .58. When the measures combined the glances for each task, the correlation between observers was .7.

Glancing analyses. The total frequency and duration of glances during each worksheet are presented in Table and Table. The percentage of time spent glancing was very low during Worksheet 1 it was 1.6%; Worksheet it was 1.5 and Worksheet 3 it was .57%.

An analysis of variance was performed on the total number of glances made during each worksheet as well as on the total duration. No significant results were obtained. These totals included glances made to the model, the model's worksheet and about the room. A total was also computed for the number of glances made to the room and to the peer for each task. No significant results were obtained from the analyses of variances.

An analysis of variance was performed on the frequency of glances made to the model's worksheet as well as on the duration of these glances. Neither analysis resulted in statistically significant results. The means are presented in Tables 22 and 23. The frequency

Table 20

Frequency of Total Glances

	N	Worksheet 1 Mean	Worksheet 1 S.D.	Worksheet 2 Mean	Worksheet 2 S.D.	Worksheet 3 Mean	Worksheet 3 S.D.
Explicit	10	3.7	3.95	5.3	6.62	4.4	4.01
General	10	1.4	1.96	1.6	1.58	1.6	2.12
Control	10	3.5	2.64	4.7	4.00	3.1	1.97
Alone	5	.8	1.79	1.8	2.17	1.2	1.79

Table 21

Duration of Total Glances

	N	Worksheet 1		Worksheet 2		Worksheet 3	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Explicit	10	4.020	6.550	7.133	12.076	4.976	6.384
General	10	1.333	2.636	.865	.943	1.747	2.650
Control	10	4.699	4.128	3.382	3.862	1.841	1.444
Alone	5	1.464	3.274	3.192	5.831	1.578	2.767

[illegible]ble 22

Fr[illegible] [illegible] Made to Model's Worksh[illegible]et

	[illegible]heet 1		Worksheet 2		Worksheet 3	
	[illegible]	S.D.	Mean	S.D.	Mean	S.D.
Expl[illegible]	1[illegible]	[illegible]	3.4	4.38	.5	.58
Gener[illegible]	1[illegible]	.32	.7	82	0	0
Contr[illegible]	1.0	[illegible].53	2.2	2.48	1.3	1.70
Alone	-	0	0	0	0	0

Table 23

Duration of Glances Made to Model's Worksheet

		Worksheet 1		Worksheet 2		Worksheet 3	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Explicit	[illegible]	0	[illegible]	5.7	10.32	.9	2.72
General	[illegible]	.1	[illegible]	.3	.40	0	0
Control	[illegible]	.7	[illegible]	1.5	2.49	.8	1.00
Alone	[illegible]	0	0	0	0	0	0

and duration of the glances made to the model were also analyzed for each worksheet by means of an analysis of variance (See Tables 24 and 25). A significant results was reported for the number of glances made to the peer for Worksheet 3 (F [2,27] = 3.[illegible], $p < .05$). A Tukey's post hoc comparison revealed that the general condition had significantly fewer glances than the explicit condition

The frequency and duration of the total glances made during each worksheet was also analyzed for the children in the exhortative (explicit and general groups) and the neutral (control and alone groups) instructions groups. No significant results were obtained.

Table 24

Frequency of Glances Made to Model

	N	Worksheet 1 Mean	Worksheet 1 S.D.	Worksheet 2 Mean	Worksheet 2 S.D.	Worksheet 3 Mean	Worksheet 3 S.D.
Explicit	10	1.2	1.48	.8	1.93	1.6	1.51
General	10	.4	.52	.3	.68	.3	.68
Control	10	.5	.71	.8	1.23	.8	.92
Alone	5	0	0	0	0	0	0

Table 25

Duration of Glances Made to Model

	N	Worksheet 1 Mean	Worksheet 1 S.D.	Worksheet 2 Mean	Worksheet 2 S.D.	Worksheet 3 Mean	Worksheet 3 S.D.
Explicit	10	1.2	1.48	.8	1.93	1.6	1.51
General	10	.4	.52	.3	.68	.3	.68
Control	10	.5	.71	.8	1.23	.8	.92
Alone	5	0	0	0	0	0	0

DISCUSSION

Study II did not produce results as clear cut as desired. This study was designed to investigate how the theory of outerdirectedness may relate to the classroom. Therefore peers were used as confederates and worksheets were chosen as the experimental materials. Contrary to prediction, little glancing was manifested and there was not evidence that the children were outerdirectedness, nor that they were distractible. Nevertheless, the conditions developed for this investigation were plausible and, in a preliminary way, clinically effective.

Observations of the children in this experiment indicated that despite the specific intention that the children involved be cooperative and helpful, they appeared to be very tense and competitive. When a child did glance, it was often when their partner turned a page. It was not only the retarded children who appeared anxious to finish; the normal children also seemed very concerned about their progress. Although the normal children were carefully instructed to work at the same pace as their peers, they often seemed to be unable to resist the urge to work as quickly as possible. Occasionally, they even shouted out "I'm done!".

The spontaneous remarks made by the retarded children indicated that these children often interpreted the suggestion to look at their partner's paper if they needed help as condescending. Remarks such as "I can do it myself" and "I don't need to look over there"

[redacted]

were often made, even by children who did in fact have great difficulty completing the worksheet. These comments lend indirect support to the interpretation of the results of Study 1. It was reported that the retarded children suppressed their glancing to the experimenter's puzzle when told they would do that puzzle next. It was suggested that these children may have wanted to demonstrate their ability to complete the puzzle without assistance, although these children did not verbalize such feelings. The pairing of children with peers may have produced an even stronger need to appear self-sufficient. These observations are, of course, speculative, but adjustments to mainstreaming are uncertain and sensitivity to possible problems is necessary (cf. Zigler & Muenchow, 1979).

Furthermore, as described by Nichols (1979) the traditional educational system focuses on social comparison; success means beating someone and every success means a failure for someone else. In a class, when a child is having more difficulty completing an assignment than his classmates, the child is likely to attribute his perceived failure to low ability. The child may ask himself, why he is dumb, why can't he do it. Mastery learning and criterion referenced testing (Bloom, 1976; Hunt, 1975) provide a different orientation to learning. Nichols (1979) argues that under a mastery learning experience the child may question how can he work things out. Nichols states that this will help maintain task oriented motivation more effectively than traditional classroom procedures.

This experimental situation seemed to exacerbate the traditional competitive system; even when an alternative way of gaining information was sanctioned, the children did not utilize it. It would be informative to systematically investigate whether children who have experienced mastery learning or open classroom situations would be more outdirected than children from the traditional classroom situations.

In addition to this need to appear self-sufficient is the socialization that takes place in a child's development that one does his own work. This is particularly stressed in school where there are often very firm rules in regard to copying or cheating. Kohlberg (1969) reports that at about the age of 6-7 a child is becoming aware that copying someone else's work is not good. At the 4-5 year level, the children do not see copying as bad and take an adult's cue or example as to what is right or expected. Therefore, it would be of interest and value to do a similar study using children with lower MA's than the children in the present study and investigate the problem developmentally.

This also highlights another possible explanation for why the retarded children did not glance at information that was relevant and useful. It may be that it seemed to be too close to what they considered cheating. They may have suppressed their glancing at that time to avoid any possible repercussions of cheating. Even though the instructions gave permission to look, the children could have been wary and unsure of any consequences of "cheating" or looking at their partner's work.

The classroom is typically structured so that the children are encouraged to not look for help and to concentrate on their own work. Often no accommodation is made to the needs of the handicapped children who have already been identified as having difficulties in performance. The probable benefits of encouraging modeling and cooperation should be investigated.

Methodologically, the use of peers caused some difficulty. The interrater reliability was low for the number and duration of glances when the glances were scored by location (peer, worksheet or room). The reliability greatly increased when these three measures were combined to yield a total glance score. However in study 1, good reliability was obtained on both scores. It appeared that two things are mainly responsible for the difficulty in scoring the glances made during Study 2. When the children did glance, it was very covert and infrequent. This made it more difficult for the observers. However, what appeared to be the major difficulty was that the two children were of similar height and they often bent over their papers. This made it very difficult for the observers to differentiate when the subject was looking at his peer's paper and when he was looking at the peer; there was a small range for the difference between these two glances. In Study 1, there was a greater difference between a glance to the experimenter who was taller than the subject, and a glance made to the task.

Another issue raised by this study is the impact that the type of materials used may have on a child's behavior. Worksheets, rather than puzzles, were used. It is open to further investigation as to whether children will be more inclined to look for information during certain tasks and to not "peek" on other tasks. Additionally, there may be an interaction between the type of task and the model's characteristics.

Worksheets were chosen so as to be representative of a task children commonly do. All of the children in this study had had lessons on money and had used similar worksheets. During pretesting the worksheets appeared appropriate. However, during the study it became quite clear that there were difficulties in using academic materials with these children. While they had all been exposed to money lessons, the range in ability was vast; some children completed them very rapidly; others never got past the first page. Unfortunately, there did not appear to be a middle ground; the children either knew money or they had no concept of it. This produced data that was skewed and had great variability. The use of these worksheets did not really allow us information on the behavior of a child who was in the process of learning.

The results of these studies suggest some new complexities and nuances in the field of outerdirectedness. The questions that appear important to investigate are not whether a child is distractible or outerdirected but what are the parameters of outerdirectedness. Issues such as the type of materials, the instructions given, the characteristics of the model may possibly influence the amount of glancing; these variables need to be systematically investigated.

Another area that appears to have great potential for the study of outerdirectedness is the use of more naturalistic observation of children in school settings (cf., Krupski, 1979; Cavallero & Porter, 1980). These studies further point out the complexity of children's attention and glancing behaviors. Krupski (1979) reported that retarded children's attention, as measured by many behaviors, including glance measures, was task related. Retarded children behaved differently in nonacademic and academic situations in the classroom. There were additional differences found when CA matched normal children were compared to EMR students.

In another naturalistic study, Cavallaro and Porter (1980) observed "at-risk" and normally developing children in a preschool classroom. They recorded many behaviors; of major interest here is their extension of a glancing measure to differentiate proximal versus distal glancing. It was reported that differential receipts and initiations of gaze by at risk children were found only at the distal range.

These findings pertain here because they demonstrate that children cannot only decide to glance or not to glance to get information, but that this behavior can be very situation specific and complex.

Whereas the present findings appear to raise more questions than they answer, it is hoped that they may in the future contribute to more informed experimentation of the issues.

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APPENDIX A

ELIGIBILITY CRITERIA FOR THE G.L.D. PROGRAM

Students in the St. Paul Public Schools who have substantial deficits in all basic skill areas and/or social-adaptive behavior are referred into the child study system for review and assessment. The major purpose of the child study involvement should be to determine appropriate programming based on individual needs and strengths. However, a related outcome of such assessments is the determination of eligibility for special education services and programs. For a student to be considered eligible for the General Learning Difficulties (G.L.D.) program, assessments must verify substantial deficits in both general academic skills and social-adaptive behavior, and further such assessments must establish a direct relationship between these deficits and the student's limited cognitive/intellectual abilities.

1. Academic Achievement - appropriate formal and informal assessments reveal that the student's current level of academic achievement:

   a. reflects a general deficit in all basic academic skills.

   b. is below that of even non-handicapped slow learners of the same age/grade level and cultural background.

   c. shows a pattern or rate of academic progress equivalent to 2/3 or less of that normally expected. (e.g. In the fall a student is placed at the appropriate reading level based on the Ginn Management System; throughout the year (s) he has trouble keeping up with the reading group; and by the end of the year the student has either fallen out of the reading group or failed to master all the skills required to continue to the next level.)

2. Learning and Cognition - classroom observations and other formal assessments should reveal substantial deficits in most, if not all of the following indicies of cognitive functioning:

   a. Problem solving strategies and skills in initial learning and transfer of learned strategies and skills to new situations.

   b. Understanding of directions, instructions, and verbal concepts.

   c. Incidental learning of general information.

   d. Learning rate for the acquisition of new material.

3. Social-Adaptive Behavior assessments should indicate deficits in the acquisition of social-adaptive behavior relative to peers of the same age and cultural background which restricts the student's general functioning in school, home and the community.

Assessment should include observation, interviews (student, parent, teacher), and adaptive behavior scales.

Assessment data should indicate:

a. Need for the systematic development of self-help and independent living skills.

b. Limited learning of social adjustment skills and strategies that seem to be related to the perceived cognitive deficit.

4. Intellectual - If the results of the above three assessment areas indicates a general learning difficulty, then an assessment should be conducted to determine the relationship between the assessed performance deficits and the students intellectual functioning.

   This intellectual assessment, conducted by a certified school psychologist, can either:

   a. Indicate that the student's current general intellectual functioning is in the mildly retarded range and thus (s)he is eligible for G.L.D. services.

   b. Suggest that the student's intellectual functioning on both verbal and performance measures is currently in the borderline retarded range, and may be eligible for G.L.D. services depending on other indicators of general cognitive functioning if, and only if, the student evidences multiple problems in learning that necessitate services from the G.L.D. program.

   c. Reveal that the student's intellectual and cognitive abilities are within the normal range, and thus (s)he is not eligible for G.L.D. services.

In summary, a student appropriate for the G.L.D. Program must be shown to have deficits in all four areas assessed (academic, social adaptive behavior, cognitive, and intellectual). Further, the student's current academic performance and social adaptive behavior should be shown to be directly related to his/her intellectual deficits and not to other factors such as cultural or language differences.

The level of G.L.D. services that a student receives must be governed by the doctrine of least restrictive alternative. That is, (s)he should receive no more or no less special education than can be documented through continuing assessment of the student's individual education plans, goals and objectives.

PLACEMENT

If the student is found to be eligible for the G.L.D. program, then:

1. The child study team should clearly explain the specifics of the program (including the relationship to mental retardation) to the parents.

2. The child study team including the parent should carefully review the existing G.L.D. services to determine if they are appropriate to meet the student's individual needs.

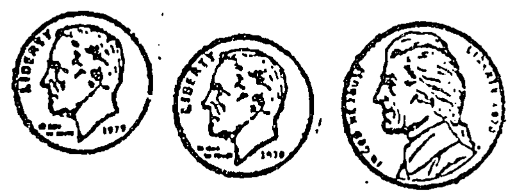
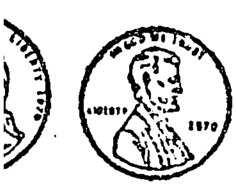
3. The child study team should recommend the amount (if any) and areas (goals in I.E.P.) for which G.L.D. services are requested.

   NOTE: All levels of service decisions should reflect the doctrine of the least restrictive alternative.

4. Recommendations for other special education services (e.g. speech and language) and regular responsibilities should also be included in the I.E.P. for students who are to receive services from the G.L.D. program.

APPENDIX B

Write the correct value in each box.

Draw a line from the picture of the money to the correct value.

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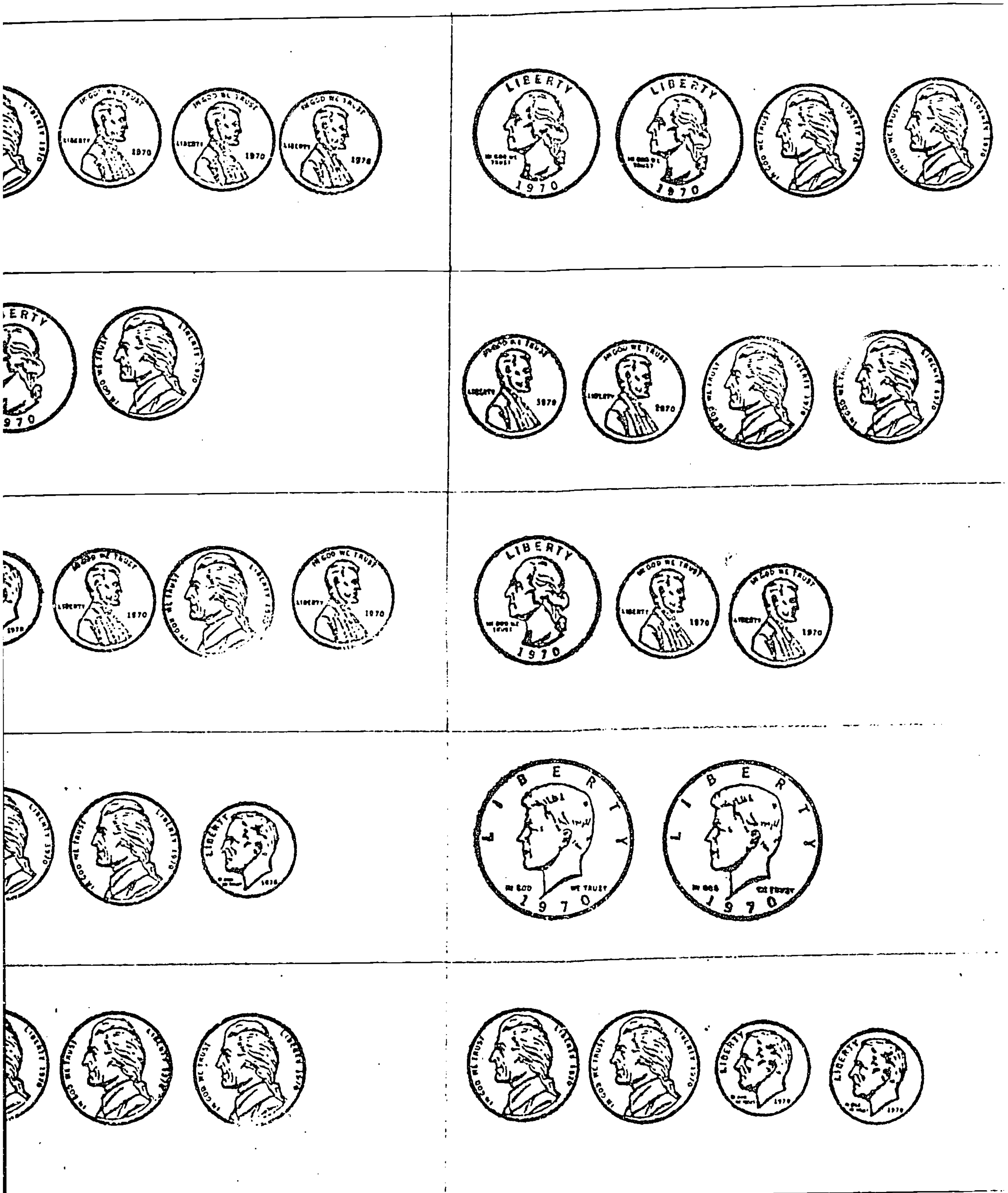

Draw a line from the picture of the money to the correct value.

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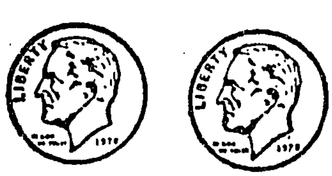

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APPENDIX C

Outerdirectedness as a Problem Solving Strategy In EMR and Normal Children[1]

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Outerdirectedness is a style of problem solving characterized as seeking cues to action in the immediate environment. To determine whether outerdirectedness is an effective problem solving strategy, a more basic "laboratory" and a more applied "field" study were conducted; this presentation will emphasize the "laboratory" study.

Outerdirectedness is thought to be related to two factors: the level of cognition attained (e.g. MA) and the degree of success experienced through using whatever cognitive resources the child has available. Turnure and Zigler (1964) asserted that the lower the MA, the more outerdirected the child, since outerdirectedness is more conducive to successful problem solving than dependence upon poorly developed cognitive skills.

In normal development, the shift from outer- to innerdirectedness is a product of both the increasing cognitive ability of the child and the withdrawal of external cues which had previously made the outerdirected style an effective one. Research in this area appears especially relevant to work with retarded children. Due to their slower rate of cognitive development, they may remain longer at the state where outerdirectedness is a principle means of gaining information. Compounding this, retarded children often have many experiences of failure when attempting self-initiated problem-solving efforts, especially when tasks are presented to them that may be appropriate for their CA but not their MA. Therefore, it appears that outerdirectedness may be a prevalent information seeking strategy for retarded children.

The original investigation of outerdirectedness was conducted by Turnure and Zigler in 1964. Since then the influence of failure experiences on the degree of outerdirectedness has been relatively well documented (MacMillan & Cauffiel, 1973; Sanders, Zigler & Butterfield, 1968; Turnure, 1970; Turnure & Zigler, 1964; Yando & Zigler, 1971). Another area that has been subject to much investigation is the developmental nature of outerdirectedness (Balla, Styfco, & Zigler, 1971; Gordon & MacLean, 1977; Massari & Mansfield, 1973; Ruble & Nakamura, 1973; and Zigler & Yando, 1972).

It was decided that one approach to determine whether outerdirectedness is an effective problem solving strategy was to investigate the relation of task difficulty and outerdirectedness. Since outerdirectedness is related to cognitive ability, it appeared that task difficulty would have a direct relationship. This area has not been greatly investigated: some evidence for the influence of task difficulty on outerdirectedness was provided by Ruble and Nakamura (1973). Indirect support was also reported by Turnure (1970) and Achenbach and Zigler (1968).

A second variable that was investigated was the type of information available and its effect on a child's utilization of external cues. This variable was included to help determine when off-task glancing reflects outerdirectedness and the child's attempt to seek available information and when it constitutes simple inattentiveness.

[1] Conference on Research in Mental Retardation, Catlinburg, Tennessee, March, 1980.

This brings up a concurrent methodological issue concerning the use of glancing as a measure of outerdirectedness. Glancing is a good direct measure, as discussed by Belmont and Butterfield (1977). However, much of the past research has relied on rather gross measures of glancing. A subject was scored for glancing when he made an overt head turn toward the experimenter. It was decided that more information would be gained by using a more refined measure of outerdirectedness, similar to that used by Ruble (1975). The procedure used in this study involved recording not only the frequency and duration of glancing but also whether the glance was made to the experimenter, to the room, or to the task. Furthermore, in order to better analyze the glancing process and relate it to behavior, it was felt important to monitor the child's glancing behavior throughout the entire experimental session. It is important to monitor the distribution of attention as well as the direction of non-task orienting. By using glancing, one can be concerned with the child's behavior that is obvious and easy to observe in a classroom or any other setting, and is probably the primary index of attentiveness relied on by teachers.

Another methodological issue that was addressed was the matching of normal and retarded children. It was important that the two groups of children have similar cognitive skills. It was possible to match the children on a composite IQ score or on their performance on a task that was very similar to the experimental task. This issue is related to what Baumeister (1967) called the most fundamental problem in comparative research with retarded and normal children. The problem is insuring that a task is an equivalent measure of the same psychological processes for both retarded and normal children. Since the children in this experiment were given a puzzle assembly task as the experimental task, the children were matched on their performance on the Block Design subtest of the WISC-R. This is also a manipulative type task that requires a child to integrate parts to make a whole.

In general, many people, both practitioners and researchers, believe that when a mentally retarded child is looking about in a learning of a testing situation, it is a sign that the child is distracted. However, rather than accepting this conclusion and positing a behavioral or physiological deficit within the mentally retarded child, a more specific and functional explanation for the behavior can often be advanced. It is suggested that any child's glancing about can be a means of gaining needed information from the environment. This is in contrast to viewing the glancing as distractibility.

Two experiments were conducted that investigated outerdirectedness as a problem solving strategy of EMR and normal children; A "laboratory" study and a more applied study. The first study, which will be emphasized here, directly examined the effects of task difficulty and the type of information available on the outerdirected behavior of children. The study examined these variables in a factorial design, with two levels of task difficulty and three levels of type of information available for both EMR and normal children. The applied study examined the effectiveness of placing EMR students next to more capable students. Due to the social significance of the mainstreaming movement it was believed important to investigate whether EMR children would look to their more capable peers for information. Also investigated was how direct the cues must be before children will look to their peers. Retarded children were paired with normal peer models and completed a worksheet under one of three instructions conditions--explicit, general or control. Each child did a form of a math worksheet first separately, then next to a peer and finally separately again. A second control group did the worksheets alone. The subjects were EMR children who were mainstreamed in intermmediate classes (4th-6th grades). Children of average or better ability were used as the peer models.

Study One
Method

This study involved equal numbers of normal and retarded children who were presented easy or difficult tasks in one of three instructions conditions--relevant cue, irrelevant cue or control: Their performance on two puzzles was scored. The design was thus a 2 (Group) x 2 (Task) x 3 (Instructions) x 2 (Trials) mixed factorial design. Pretesting was undertaken to identify easy and difficult puzzle assembly tasks for children with MA's of approximately 7-1/2.

The subjects were 60 EMR and 60 normal children who attended urban elementary schools and represented a wide range of SES backgrounds. The criteria for inclusion into the study for the EMR children were that they be classified by the school district as EMR and that they receive a raw score of at least 6 on the Block Design subtest and a scaled score of 8 or below. The mean Block Design score as 14.0; this mean is a score that one would expect of a normal child approximately 7.8 years old. The range was 6 - 25. The mean CA for the EMR children was 11.7 years old. The normal children were first graders whose Block Design scores ranged from 6 to 24, with a mean of 14.3. The average CA of these children was 7.9 years old. (See Table 1).

Puzzles adopted from the WISC-R object assembly test were used as the difficult puzzles. These were eight piece puzzles of a face and a car. The easy puzzles were four piece puzzles of a horse and an elephant that have been used in previous research (Turnure & Zigler, 1964). For the irrelevant cue conditions, the E assembled puzzles that were different from the childrens' puzzles. For the easy condition she assembled the doll puzzle of the WISC-R and for the difficult condition the horse puzzle was used, also from the WISC-R.

Observations of glancing behavior were recorded by means of a Rustrak Event Recorder. This allowed the continuous measurement of orienting responses and resulted in a record of the duration, frequency and location of the child's glancing behavior throughout the session. The session was divided into several segments: instructions, Puzzle 1, the interim period, the second set of instructions, and finally, Puzzle 2. For 34% of the children two observers independently scored the glancing behavior.

Before the child entered the room the E placed the pieces of the appropriate puzzle on the table under cardboard shields. The order of presentation of the puzzles was counterbalanced. The experimenter also completed a puzzle for the experimental conditions: either the second object assembly puzzles or an irrelevant puzzle. The child was brought to the room by the principal investigator who was the only member of the experimental team with knowledge of the child's classification. The experimenters and observers were blind to the exact design of the experiment, the hypotheses and the children's classification.

After the child was seated next to the experimenter and accoustomed to the situation, the experimenter uncovered the puzzle pieces and gave the instructions that were appropriate for the condition to which the child had been assigned. The critical part of the instructions for the relevant cue condition was: ~~..."While you are putting yours together, I will put one together too."...; for the irrelevant cue condition the instructions included~~ ..."While you are putting yours together, I will put one together too. After you finish your puzzle, you will then do my puzzle."...; for the irrelevant cue condition the instructions included..."While you are putting yours together, I will put one together too. After you finish your puzzle, you'll do another puzzle that is different from your puzzle and my puzzle." The children in the control condition received standard instructions that simply stressed putting together their puzzle.

With the experimental groups, the experimenter quickly assembled the appropriate puzzle and left it in view for 10 seconds. The puzzle was then disassembled and the pieces left in view for 30 seconds. If the subject was still working on his task, this cycle was repeated. For the control subjects, the experimenter remained next to the subject but, of course, did not assemble any puzzle.

When the subject completed the task or after a three minute time limit elapsed, the experimenter covered her own puzzle pieces and recorded the subject's score for task 1 and the time required by the subject to complete the puzzle. Puzzle 1 was removed and pieces of puzzle 2 were placed in front of the subject. The child was then told to complete the puzzle; during this puzzle the experimenter did not perform any activity. After the subject completed the second puzzle the E again recorded the subject's score and the time it took to complete the puzzle.

After the child had left the room, the experimenter and observers independently rated their estimate of the child's cognitive level. A five point scale was used including low, low average, average, above average and high.

Results and Discussion

Briefly, in terms of the puzzle scores, the conditions involving the easy puzzle groups produced results generally in accordance with expectations (See Table 2 and Figure 1). However, the data comparing pertinent groups did not reach statistical significance and therefore cannot be considered to verify the theory. Looking at the normal children's scores on Puzzle 1 and Puzzle 2, the greatest increase was made in the relevant cue condition, with only a slight increase for the irrelevant cue condition. The greatest increase in scores between Puzzles 1 and 2 is for the retarded children in the relevant cue condition. For the retarded children in the irrelevant cue easy puzzles condition there is a decrease in their performance over puzzles. These children observed the experimenter complete a puzzle that was different from the puzzles they completed and it appears that this may have somewhat hampered their performance. These patterns of results are in accord with past findings and theory, with the possible exception of the MR irrelevant cue group on puzzle 1, which is unexpectedly high.

While these results are interpretable, the results for the hard puzzles conditions remain somewhat mysterious and contradictory. For the control conditions there is a slight increase over the two tasks, indicative of a standard learning effect. However there were not consistent results for the experimental conditions involving the hard puzzles: Both relevant cue groups decreased from Puzzle 1 to Puzzle 2, contrary to expectations; meanwhile, the MR irrelevant group <u>increased</u> as the Normal irrelevant groups <u>decreased</u>, which seems the reverse of intuition as well as theory! The results demonstrated that the dynamics of the situation were somehow affected by the instructions or the experimenter completing a puzzle.

More consistent and interpretable results were obtained from the glancing measures. First, it should be mentioned that the expanded measure of glancing proved to be reliable. The correlation between observers' scores for all instances in which at least one observer scored a glance was .92 for the frequency of glancing and .88 for the duration. The correlation for the total frequency of glances was .98 and for the duration it was also .98. It was also found that during the time the puzzles were present the normal and retarded children were non-task oriented for a very small percentage of the time--3.5%.

The hypothesis that children would glance more when information was available was supported (see Table 17). During Puzzle 1, the children in the relevant and irrelevant cue conditions had a significantly greater total number of glances than did the children in the control condition and they had a significantly greater number of glances to the experimenter's puzzle. Also the children in the relevant and irrelevant cue conditions had a greater duration and frequency of glancing during the instructions for Puzzle 1. Additionally, there were no significant differences between retarded and normal children for how often they looked about the room. Therefore, it appears that there was no manifestation of greater distractibility by retarded children than by normal children of this MA, in this situation. These findings also appear to support the interpretation that glancing, or outerdirectedness is an information seeking strategy. This interpretation is further supported by the finding that during Puzzle 1 the children glanced longer at the experimenter's puzzle for the difficult puzzle than for the easy puzzle.

Several interesting group by instructions interactions were found to be statistically significant and will be discussed here. The predictions regarding the amount of glancing varying according to the type of cues available were supported by the normal children. For the total number of glances made during Puzzle 1, which is when the manipulation occured, it was evident that the normal child glances the most when the experimenter was working on the puzzle they knew they would do next (see Figure 2). A moderate amount of glancing was done in the irrelevant cue condition, where the children knew the puzzle the experimenter was working on was one they would not complete. Very little glancing was done during the control condition at which time the experimenter was not completing a puzzle.

The retarded children demonstrated a similar pattern of glancing as the normal children for the irrelevant cue and control conditions. However, there was a great discrepancy between the retarded and normal children's glancing for the relevant cue condition during Puzzle 1. The retarded children glanced less than half as much as did the normal children.

This finding can be best understood by investigating the results for the glance measures that are broken down into where specifically the child was glancing; at the experimenter, at the experimenter's task or about the room. A significant group by instructions interaction was found for the number and duration of glances made to the experimenter's puzzle for the first puzzle. The pattern of the normal and retarded children's glances was very similar to their pattern for total glances during Puzzle 1. Again there was the similar performance by the retarded and normal children for the irrelevant and control conditons. Also there was the marked descrepancy between the two groups for the relevant cue condition: the normal children glanced five times more often and three times longer than the retarded children glanced at the experimenter's puzzle.

It appeared that this decrease in glancing could be viewed as a suppression by the retarded children of their glancing to the experimenter's task. This decrease was found only in regard to the experimenter's task and only for the condition in which the children were told that they would do the puzzle the experimenter was working on as their second puzzle. This finding was contrary to prediction; it was hypothesized that the retarded children would glance most in this condition.

These results indicate that the behavioral indices of the outerdirected mechanism can be suppressed for those children whose MA is not increasing at the normal rate. The answer remains speculative as to why these children suppressed their glancing. It may be due to some dynamics of ther general deficit and/or due to their socialization history. The children may have viewed the situation as condescending in that they were required to do the same puzzle the experimenter had already completed. They may have wanted to demonstrate their ability to do it themselves without help. This may have been a resistance to receiving direct help.

Although the children in this study did not verbalize such feelings, the spontaneous comments of children from Study 2 lend indirect support to this interpretation. As mentioned earlier, for Study 2 retarded children were paired with peers of at least average ability and required to complete worksheets. The remarks of the retarded children in this study indicated that these children often interpreted the suggestion to look at their partner's paper if they needed help as condescending. Remarks such as "I can do it myself" and "I don't need to look over there" were often made, even by children who did in fact have great difficulty completing the worksheet. It is suggested that the pairing of children with peers may have produced an even stronger need to appear self-sufficient.

Another possibility is that the children's socialization history at school may have influenced their performance. Teachers and the educational system often stress to a child to do his own work. It is possible that this suppression of glancing was found mainly in the retarded children because they have been in the school system much longer than the younger, normal children. While this behavior is appropriate at times, this suppression of looking for cues to guide one's actions can be unfortunate in some instances and could be viewed as maladaptive in others. Even though helpful cues were available and the task was difficult, some children did not look for help and seemed to actually suppress their glances to the area where information was available. It appears that this could be interpreted as an instance of socialization transcending adaptation. While the independent achievement of the MR Relevant Cue group could be considered laudatory (assuming our interpretation of their striving for autonomy has some validity), such a development can hardly be considered completely satisfactory if it also entails uncooperativeness or some other overreaction. These observations are, of course, speculative, but adjustments to mainstreaming are uncertain and sensitivity to possible problems is necessary (cf Zigler & Muenchow, 1979).

As an additional measure during the experiment, the observers and experimenters were required to estimate each child's cognitive level on a five point scale. These people did not know that half of the subjects were retarded. The child was rated at the end of the session so the observers did have some information as to how the child functioned. The observers, on the whole, were able to differentiate between retarded and nonretarded children. However, as the results demonstrate, the observers were often inaccurate and rated normal children as below average and retarded children as average (see Table 3). The observers rated the children after they performed the experimental tasks. It would be informative in future research to have the observers rate the child solely on an initial impression and then rate the child again after he/she had completed the experimental task.

The results from this investigation indicate that the conditions that unequivocally expose the existence or nonexistence of outerdirected tendencies have not been identified. It appears important to accept the fact that there is much variability in the data since subject's tendencies are being investigated.

In the future, it is believed that it will be important to have some studies with very large sample sizes to help systematize the variability. Another important extension of the research would be to get at more direct processing indicators by use of individual subjects and the record of neurophysical and fine eye movement data to investigate the in-depth and information processing mechanisms.

Whereas the present findings appear to raise more questions than they answer, it is hoped that they may in the future contribute to more informed experimentation of the issues. Some of the questions that remain relate to the parameters of outer directedness. It appears that children decide not only to look for information but they can also decide not to look. Issues such as the type of materials, the instructions give, and the characteristics of the model may possibly influence the amount of glancing; these variables need to be further investigated.

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Table 1

CA, BLOCK DESIGN SCORE, SCALED SCORES OF GROUPS

Table I

		N	CA in months		BD		SS	
			Mean	S. D.	Mean	S. D.	Mean	S. D.
NORMAL	Easy Relevant	10	87.2	4.44	14.0	5.81	11.0	1.94
	Easy Irrelevant	10	85.9	4.23	14.2	6.20	10.9	2.40
	Easy Control	10	86.0	3.80	14.3	4.64	11.1	1.45
	Hard Relevant	10	86.6	4.55	15.1	6.48	11.1	2.03
	Hard Irrelevant	10	84.0	3.65	14.3	4.92	11.3	1.64
	Hard Control	10	87.1	3.57	13.9	5.55	10.8	1.87
RETARDED	Easy Relevant	10	139.5	9.36	14.0	5.72	5.5	1.90
	Easy Irrelevant	10	135.8	9.05	14.3	6.27	5.7	1.89
	Easy Control	10	142.7	12.30	13.6	5.66	5.0	2.67
	Hard Relevant	10	143.7	11.80	14.4	7.28	5.0	2.45
	Hard Irrelevant	10	138.2	12.20	13.7	5.01	5.8	1.55
	Hard Control	10	140.1	14.54	13.8	5.85	5.3	2.16

Table 2

PUZZLE SCORES BY CONDITION

		Puzzle 1		Puzzle 2	
		Mean	S.D.	Mean	S.D.
NORMAL	Easy Relevant	4.0	2.05	5.0	1.16
	Easy Irrelevant	3.7	1.70	3.9	1.60
	Easy Control	4.5	1.58	5.3	1.89
	Hard Relevant	4.65	1.959	3.6	1.449
	Hard Irrelevant	3.7	1.438	2.35	1.510
	Hard Control	3.55	1.442	3.8	1.829
RETARDED	Easy Relevant	4.4	2.41	5.5	1.08
	Easy Irrelevant	5.2	1.55	4.4	2.17
	Easy Control	4.5	2.80	4.3	2.31
	Hard Relevant	3.35	1.528	3.05	1.571
	Hard Irrelevant	3.4	1.506	4.3	1.814
	Hard Control	3.05	2.153	3.6	1.578

Table 3

Table 17 ACCURATE CLASSIFICATIONS AND MISSES FOR CHILDREN'S COGNITIVE CLASSIFICATION BY EXPERIMENTERS

NAIVE

	Cognitive Ability Low	High
Normal	7	36
Retarded	13	19

NAIVE

	Low	High
Normal	6	24
Retarded	20	22

EXPERIENCED GRADUATED STUDENT

	Low	High
Normal	6	11
Retarded	19	0

RETARDED SIBLING AT HOME

	Low	High
Normal	8	22
Retarded	14	17

Figure 1

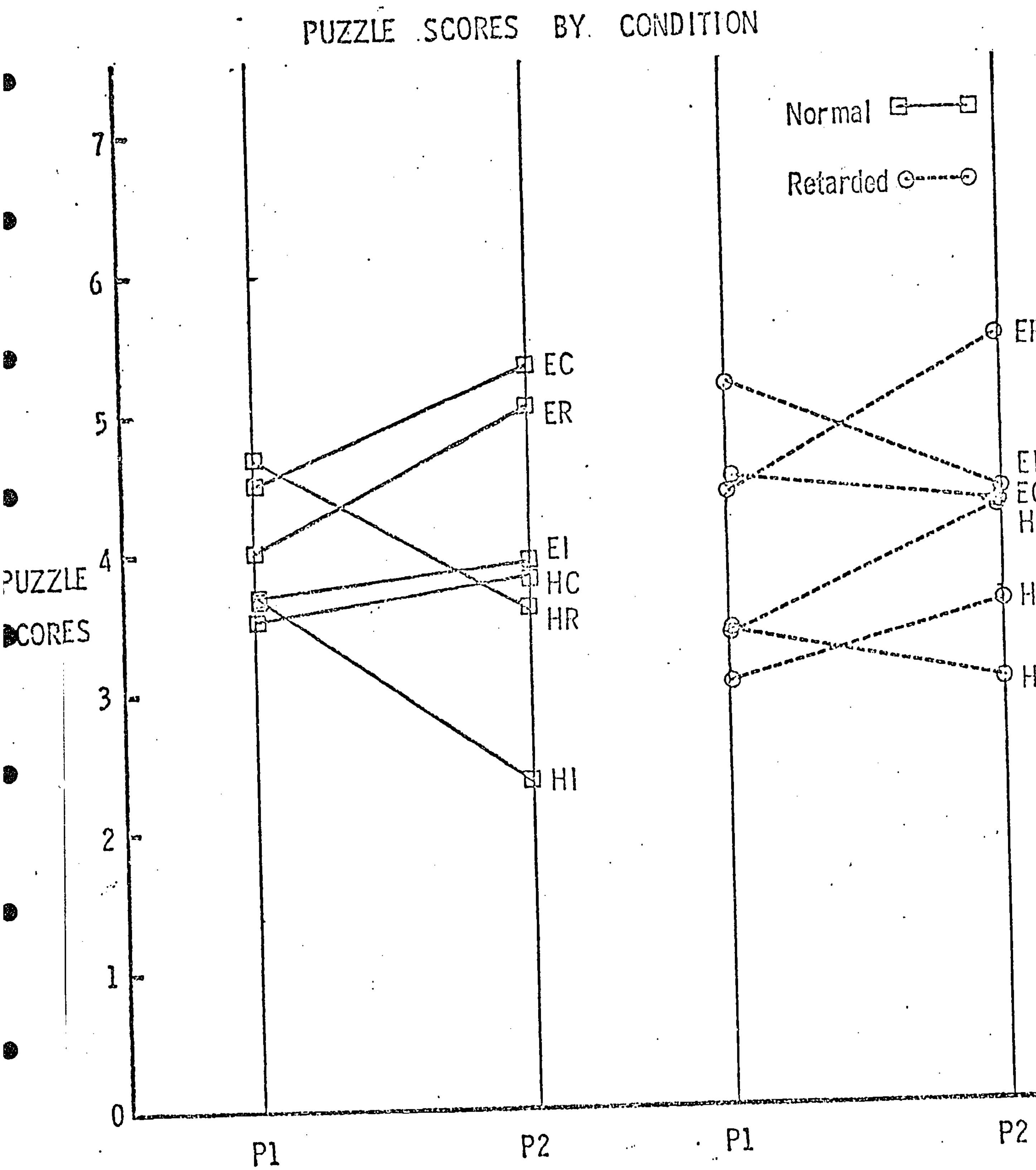
PUZZLE SCORES BY CONDITION
Normal
Retarded
PUZZLE SCORES
0
1
2
3
4
5
6
7
P1
P2
P1
P2
EC
ER
EI
HC
HR
HI
ER
EI
EC
HI
HC
HR

Figure 2

NUMBER OF TOTAL GLANCES DURING PUZZLE 1

ANOVA Group X Instructions $p < .05$

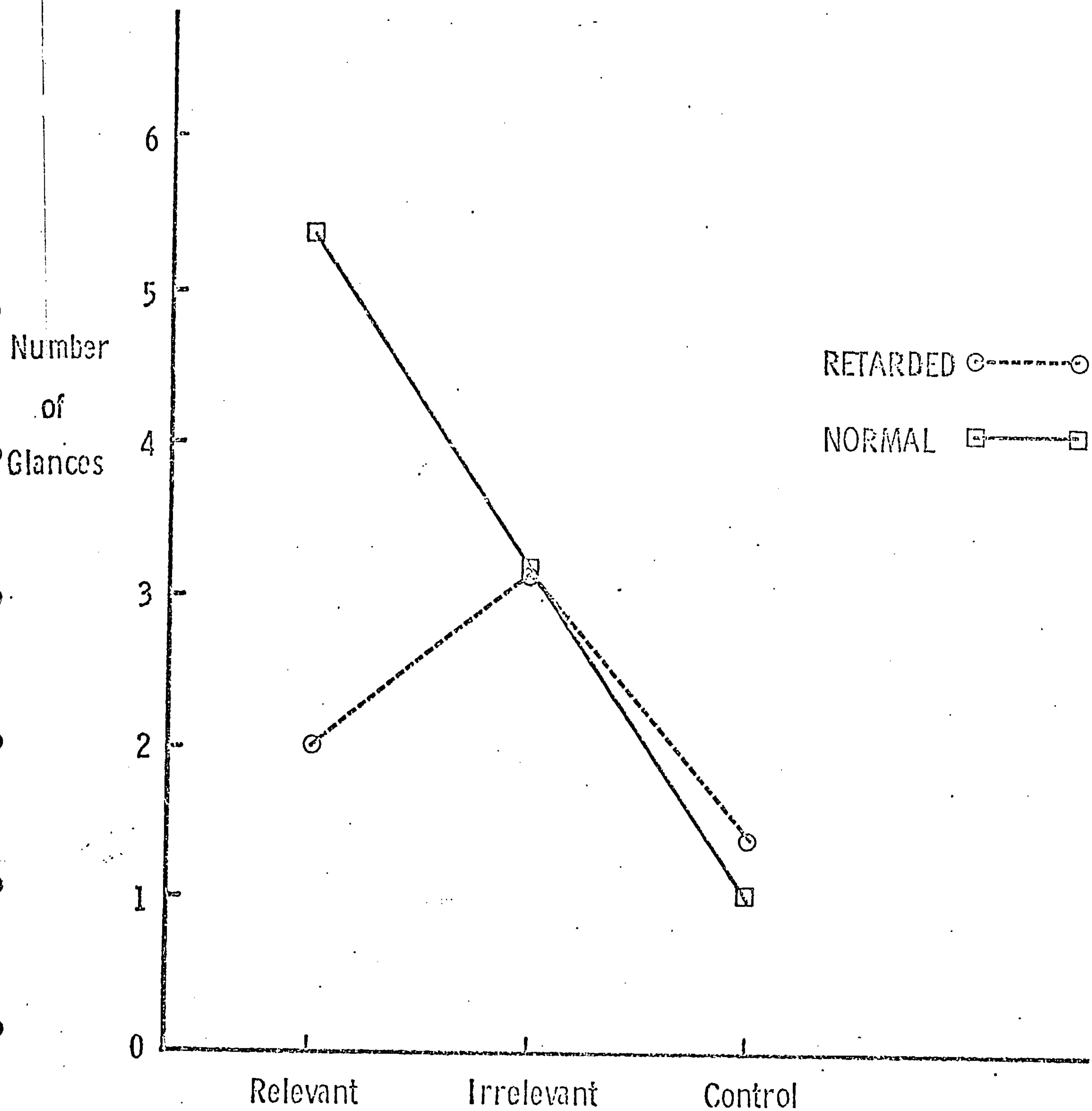

TABLE 7

Frequency and Duration of Total Glances Made During Puzzle 1 and Puzzle 2

		Frequency		Duration	
		Mean	S.D.	Mean	S.D.
Normal	Easy Relevant	6.7	4.37	5.2	4.88
	Easy Irrelevant	3.2	2.35	2.7	2.31
	Easy Control	1.8	1.81	1.5	2.05
	Hard Relevant	6.7	7.33	6.2	9.10
	Hard Irrelevant	5.4	3.84	3.9	3.05
	Hard Control	1.8	1.48	1.4	2.04
Retarded	Easy Relevant	1.1	1.20	.7	1.10
	Easy Irrelevant	4.8	6.61	2.6	3.29
	Easy Control	1.4	1.84	1.3	1.60
	Hard Relevant	4.9	6.67	4.7	7.44
	Hard Irrelevant	3.1	2.69	2.4	2.63
	Hard Control	3.1	2.42	2.4	1.85

APPENDIX D

Outerdirectedness as a Problem Solving Strategy In EMR and Normal Children[1]

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Outerdirectedness is a style of problem solving characterized as seeking cues to action in the immediate environment. To determine whether outerdirectedness is an effective problem solving strategy, a more basic "laboratory" and a more applied "field" study were conducted.

Outerdirectedness is thought to be related to two factors: the level of cognition attained (e.g. MA) and the degree of success experienced through using whatever cognitive resources the child has available. Turnure and Zigler (1964) asserted that the lower the MA, the more outerdirected the child, since outerdirectedness is more conducive to successful problem solving than dependence upon poorly developed cognitive skills.

In normal development, the shift from outer- to innerdirectedness is a product of both the increasing cognitive ability of the child and the withdrawal of external cues which had previously made the outerdirected style an effective one. Research in this area appears especially relevant to work with retarded children. Due to their slower rate of cognitive development, they may remain longer at the state where outerdirectedness is a principle means of gaining information. Compounding this, retarded children often have many experiences of failure when attempting self-initiated problem-solving efforts, especially when tasks are presented to them that may be appropriate for their CA but not their MA. Therefore, it appears that outerdirectedness may be a prevalent information seeking strategy for retarded children.

The original investigation of outerdirectedness was conducted by Turnure and Zigler in 1964. Since then the influence of failure experiences on the degree of outerdirectedness has been relatively well documented (MacMillan & Cauffiel, 1973; Sanders, Zigler & Butterfield, 1968; Turnure, 1970; Turnure & Zigler, 1964; Yando & Zigler, 1971). Another area that has been subject to much investigation is the developmental nature of outerdirectedness (Balla, Styfco, & Zigler, 1971; Cordon & MacLean, 1977; Massari & Mansfield, 1973; Ruble & Nakamura, 1973; and Zigler & Yando, 1972).

In general, many people, both practitioners and researchers, believe that when a mentally retarded child is looking about in a learning of a testing situation, it is a sign that the child is distracted. However, rather than accepting this conclusion and positing a behavioral or physiological deficit within the mentally retarded child, a more specific and functional explanation for the behavior can often be advanced. It is suggested that any child's glancing about can be a means of gaining needed information from the environment. This is in contrast to viewing the glancing as distractibility.

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It was decided that one approach to determine whether outerdirectedness is an effective problem solving strategy was to investigate the relation of task difficulty and outerdirectedness. Since outerdirectedness is related to cognitive ability, it appeared that task difficulty would have a direct relationship. This area has not been greatly investigated: some evidence for the influence of task difficulty on outerdirectedness was provided by Ruble and Nakamura (1973). Indirect support was also reported by Turnure (1970) and Achenbach and Zigler (1968).

A second variable that was investigated was the type of information available and its effect on a child's utilization of external cues. This variable was included to help determine when off-task glancing reflects outerdirectedness and the child's attempt to seek available information and when it constitutes simple inattentiveness.

This brings up a concurrent methodological issue concerning the use of glancing as a measure of outerdirectedness. Glancing is a good direct measure, as discussed by Belmont and Butterfield (1977). However, much of the past research has relied on rather gross measures of glancing. A subject was scored for glancing when he made an overt head turn toward the experimenter. It was decided that more information would be gained by using a more refined measure of outerdirectedness, similar to that used by Ruble (1975). The procedure used in the present study involved recording not only the frequency and duration of glancing but also whether the glance was made to the experimenter, to the room, or to the task. Furthermore, in order to better analyze the glancing process and relate it to behavior, it was felt important to monitor the child's glancing behavior throughout the entire experimental session. It is important to monitor the distribution of attention as well as the direction of non-task orienting. By using glancing, one can be concerned with the child's behavior that is obvious and easy to observe in a classroom or any other setting, and is probably the primary index of attentiveness relied on by teachers.

Another methodological issue that was addressed was the matching of normal and retarded children. It was important that the two groups of children have similar cognitive skills. It was possible to match the children on a composite IQ score or on their performance on a task that was very similar to the experimental task. This issue is related to what Baumeister (1967) called the most fundamental problem in comparative research with retarded and normal children. The problem is insuring that a task is an equivalent measure of the same psychological processes for both retarded and normal children. Since the children in this experiment were given a puzzle assembly task as the experimental task, the children were matched on their performance on the Block Design subtest of the WISC-R. This is also a manipulative type task that requires a child to integrate parts to make a whole.

Two experiments were conducted that investigated outerdirectedness as a problem solving strategy of EMR and normal children. The first study, directly examined the effects of task difficulty and the type of information available on the outerdirected behavior of children. The study examined these variables in a factorial design, with two levels of task difficulty and three levels of type of information available for both EMR and normal children. The applied study examined the effectiveness of placing EMR students next to more capable students.

Study One

Method

This study involved equal numbers of normal and retarded children who were presented easy or difficult tasks in one of three instructions conditions--relevant cue, irrelevant cue or control: Their performance on two puzzles was scored. The design was thus a 2 (Group) x 2 (Task) x 3 (Instructions) x 2 (Trials) mixed factorial design. Pretesting was undertaken to identify easy and difficult puzzle assembly tasks for children with MA's of approximately 7-1/2.

The subjects were 60 EMR and 60 normal children who attended urban elementary schools and represented a wide range of SES backgrounds. The criteria for inclusion into the study for the EMR children were that they be classified by the school district as EMR and that they receive a raw score of at least 6 on the Block Design subtest and a scaled score of 8 or below. The mean Block Design score as 14.0; this mean is a score that one would expect of a normal child approximately 7.8 years old. The range was 6 - 25. The mean CA for the EMR children was 11.7 years old. The normal children were first graders whose Block Design scores ranged from 6 to 24, with a mean of 14.3. The average CA of these children was 7.9 years old. (See Table 1).

Puzzles adopted from the WISC-R object assembly test were used as the difficult puzzles. These were eight piece puzzles of a face and a car. The easy puzzles were four piece puzzles of a horse and an elephant that have been used in previous research (Turnure & Zigler, 1964). For the irrelevant cue conditions, the E assembled puzzles that were different from the childrens' puzzles. For the easy condition she assembled the doll puzzle of the WISC-R and for the difficult condition the horse puzzle was used, also from the WISC-R.

Observations of glancing behavior were recorded by means of a Rustrak Event Recorder. This allowed the continuous measurement of orienting responses and resulted in a record of the duration, frequency and location of the child's glancing behavior throughout the session. The session was divided into several segments: instructions, Puzzle 1, the interim period, the second set of instructions, and finally, Puzzle 2. For 34% of the children two observers independently scored the glancing behavior.

Before the child entered the room the E placed the pieces of the appropriate puzzle on the table under cardboard shields. The order of presentation of the puzzles was counterbalanced. The experimenter completed a puzzle for the experimental conditions: either the second object assembly puzzle or an irrelevant puzzle. The child was brought to the room by the principal investigator who was the only member of the experimental team with knowledge of the child's classification. The experimenters and observers were blind to the exact design of the experimenter, the hypotheses and the children's classification.

After the child was seated next to the experimenter and accoustomed to the situation, the experimenter uncovered the puzzle pieces and gave the instructions that were appropriate for the condition to which the child had been assigned. The critical part of the instructions for the relevant cue condition was: ..."While you are putting yours together, I will put one together too. After you finish your puzzle, you will then do my puzzle."...; for the irrelevant cue condition the instructions included..."While you are putting yours together, I will put one together too. After you finish your puzzle, you'll do another puzzle that is different from your puzzle and my puzzle." The children in the control condition received standard instructions that simply stressed putting together their puzzle.

With the experimental groups, the experimenter quickly assembled the appropriate puzzle and left it in view for 10 seconds. The puzzle was then disassembled and the pieces left in view for 30 seconds. If the subject was still working on his task, this cycle was repeated. For the control subjects, the experimenter remained next to the subject but, of course, did not assemble any puzzle.

When the subject completed the task or after a three minute time limit elapsed, the experimenter covered her own puzzle pieces and recorded the subject's score for task 1 and the time required by the subject to complete the puzzle. Puzzle 1 was removed and pieces of puzzle 2 were placed in front of the subject. The child was then told to complete the puzzle; during this puzzle the experimenter did not perform any activity. After the subject completed the second puzzle the E again recorded the subject's score and the time it took to complete the puzzle.

After the child had left the room, the experimenter and observers independently rated their estimate of the child's cognitive level. A five point scale was used including low, low average, average, above average and high.

Results and Discussion

Briefly, in terms of the puzzle scores, the conditions involving the easy puzzle groups produced results generally in accordance with expectations (See Table 2 and Figure 1). However, the data comparing pertinent groups did not reach statistical significance and therefore cannot be considered to verify the theory. Looking at the normal children's scores on Puzzle 1 and Puzzle 2, the greatest increase was made in the relevant cue condition, with only a slight increase for the irrelevant cue condition. The greatest increase in scores between Puzzles 1 and 2 is for the retarded children in the relevant cue condition. For the retarded children in the irrelevant cue easy puzzles condition there is a decrease in their performance over puzzles. These children observed the experimenter complete a puzzle that was different from the puzzles they complet d and it appears that this may have somewhat hampered their performance. These patterns of results are in accord with past findings and theory, with the possible exception of the MR irrelevant cue group on puzzle 1, which is unexpectedly high.

While these results are interpretable, the results for the hard puzzles conditions remain somewhat mysterious and contradictory. For the control conditions there is a slight increase over the two tasks, indicative of a standard learning effect. However there were not consistent results for the experimental conditions involving the hard puzzles: Both relevant cue groups decreased from Puzzle 1 to Puzzle 2, contrary to expectations; meanwhile, the MR irrelevant group increased as the Normal irrelevant groups decreased, which seems the reverse of intuition as well as theory! The results demonstrated that the dynamics of the situation were somehow affected by the instructions or the experimenter completing a puzzle.

More consistent and interpretable results were obtained from the glancing measures. First, it should be mentioned that the expanded measure of glancing proved to be reliable. The correlation between observers' scores for all instances in which at least one observer scored a glance was .92 for the frequency of glancing and .88 for the duration. The correlation for the total frequency of glances was .98 and for the duration it was also .98. It was also found that during the time the puzzles were present the normal and retarded children were non-task oriented for a very small percentage of the time--3.5%.

The hypothesis that children would glance more when information was available was supported. During Puzzle 1, the children in the relevant and irrelevant cue conditions had a significantly greater total number of glances than did the children in the control condition and they had a significantly greater number of glances to the experimenter's puzzle. Also the children in the relevant and irrelevant cue conditions had a greater duration and frequency of glancing during the instructions for Puzzle 1. Additionally, there were no significant differences between retarded and normal children for how often they looked about the room. Therefore, it appears that there was no manifestation of greater distractibility by retarded children than by normal children of this MA, in this situation. These findings also appear to support the interpretation that glancing, or outer-directedness is an information seeking strategy. This interpretation is further supported by the finding that during Puzzle 1 the children glanced longer at the experimenter's puzzle for the difficult puzzle than for the easy puzzle.

Several interesting group by instructions interactions were found to be statistically significant. The predictions regarding the amount of glancing varying according to the type of cues available were supported by the normal children. For the total number of glances made during Puzzle 1, which is when the manipulation occured, it was evident that the normal child glanced the most when the experimenter was working on the puzzle they knew they would do next (see Figure 2). A moderate amount of glancing was done in the irrelevant cue condition, where the children knew the puzzle the experimenter was working on was one they would not complete. Very little glancing was done during the control condition at which time the experimenter was not completing a puzzle.

The retarded children demonstrated a similar pattern of glancing as the normal children for the irrelevant cue and control conditions. However, there was a great discrepancy between the retarded and normal children's glancing for the relevant cue condition during Puzzle 1. The retarded children glanced less than half as much as did the normal children.

This finding can be best understood by investigating the results for the glance measures that are broken down into where specifically the child was glancing; at the experimenter, at the experimenter's task or about the room. A significant group by instructions interaction was found for the number and duration of glances made to the experimenter's puzzle for the first puzzle. The pattern of the normal and retarded children's glances was very similar to their pattern for total glances during Puzzle 1. Again there was the similar performance by the retarded and normal children for the irrelevant and control conditions. Also there was the marked descrepancy between the two groups for the relevant cue condition: the normal children glanced five times more often and three times longer than the retarded children glanced at the experimenter's puzzle.

It appeared that this decrease in glancing could be viewed as a suppression by the retarded children of their glancing to the experimenter's task. This decrease was found only in regard to the experimenter's task and only for the condition in which the children were told that they would do the puzzle the experimenter was working on as their second puzzle. This finding was contrary to prediction; it was hypothesized that the retarded children would glance most in this condition.

These results indicate that the behavioral indices of the outerdirected mechanism can be suppressed for those children whose MA is not increasing at the normal rate. The answer remains speculative as to why these children suppressed their glancing. It may be due to some dynamics of their general deficit and/or due to their socialization history. The children may have viewed the situation as condescending in that they were required to do the same puzzle the experimenter had already completed. They may have wanted to demonstrate their ability to do it themselves without help. This may have been a resistance to receiving direct help.

Another possibility is that the children's socialization history at school may have influenced their performance. Teachers and the educational system often stress to a child to do his own work. It is possible that this suppression of glancing was found manily in the retarded children because they have been in the school system much longer than the younger, normal children. While this behavior is appropriate at times, this suppression of looking for cues to guide one's actions can be unfortunate in some instances and could be viewed as maladaptive in others. Even though helpful cues were available and the task was difficult, some children did not look for help and seemed to actually suppress their glances to the area where information was available. It appears that this could be interpreted as an instance of socialization transcending adaptation. While the independent achievement of the MR Relevant Cue group could be considered laudatory (assuming our interpretation of their striving for autonomy has some validity), such a development can hardly be considered completely satisfactory if it also entails uncooperativeness or some other overreaction. These observations are, of course, speculative, but adjustments to mainstreaming are uncertain and sensitivity to possible problems is necessary (cf Zigler & Muenchow, 1979).

As an additional measure during the experiment, the observers and experimenters were required to estimate each child's cognitive level on a five point scale. These people did not know that half of the subjects were retarded. The child was rated at the end of the session so the observers did have some information as to how the child functioned. The observers, on the whole, were able to differentiate between retarded and nonretarded children. However, as the results demonstrate, the observers were often inaccurate and rated normal children as below average and retarded children as average (see Table 3). The observers rated the children after they performed the experimental tasks. It would be informative in future research to have the observers rate the child solely on an initial impression and then rate the child again after he/she had completed the experimental task.

STUDY II

In order to investigate how research in outerdirectedness could become more directly related to the classroom situation a second study was carried out. Previous research had demonstrated that children did look for and use cues gained from adult experimenters as well as machines (e.g. Achenbach & Zigler, 1968; Turnure, 1970). However, these sources of information are limited in a normal classroom: there are seldom teaching machines in classrooms and the amount of time a teacher or other adult can spend individually with each pupil is limited. However children are usually in close contact or proximity to other children in the class. It appears important to investigate whether peers could be used as information agents.

This concept appears to be particularly germane in the field of mental retardation, due to the mainstreaming movement. This philosophy believes that mentally retarded children can benefit, both academically and socially, from exposure to children with average abilities. It seems important to investigate whether EMR children could or do look to their more capable peers for information and whether they are able to utilize this information. Also of importance is the issue of how conducive to outerdirectedness are the materials that are used daily in classrooms, such as worksheets. Finally of interest is, whether cues must be direct before children will look to their peers for information.

Methods

Experimental Design

Retarded children were paired with normal peer models and completed a worksheet under one of three instructions conditions--explicit, general or control. Each child did a form of the worksheet first separately, then next to the peer, and finally separately again. A second control group consisted of five retarded children who worked alone.

Subjects

The subjects were 35 retarded children who attended urban public elementary schools and represented a wide range of SES backgrounds. These children were mainstreamed in the intermediate classes which correspond to the fourth to sixth grades.

Children of average or better intelligence were used as peer models. These children were paired with a retarded child to whom they were familiar. These normal children were selected by their teachers as having performed well in school.

Materials

Worksheets that consisted of pictures of coins were used, and the children were required to know the value of the coins. Pretesting was carried out to assure that the worksheets were of average difficulty for this population. All children had been exposed in class to similar types of worksheets. Three forms of the worksheets were constructed. All three forms had the same problems but in different order.

As in study I, glancing behavior was recorded by means of a Rustrak Event Recorder. A glance was coded according to whether it was made to the peer model, the peer model's worksheet or to the room. The observers recorded the subjects glancing behavior during the three sets of instructions and while the child was completing the three sets of worksheets.

Procedure

The peer model was first brought to the experimental room in the child's school by the principle investigator. She/he was shown a copy of the worksheet and was asked to verbally solve some of the problems. No peer model had more than minor difficulty, with only an occasional miss. The model was praised and then told that the experimenters were working with children and wanted the model to do the worksheet with another child. The model was then told that he might know his money better than his partner and was told to slow down if needed so that he and his partner would finish at the same time. It was also stressed that for this situation it would be allright if he looked at his partner's paper or if his partner looked at his paper.

The subject was then brought into the room and introduced to everyone. The experimenter then gave the following instructions. "We want to find out more about how children learn. What we are doing today is seeing if it matters where a child sits. So what I want to do is have you do some worksheets while you are in different seating arrangements". The seating arrangements were devised, so that the children were first separated, then seated side by side, then separated again.

The experimental manipulation occurred when the children were seated together. The experimenter gave the following instructions depending upon the condition the child was in:

> Explicit Instructions: Now I want you both to complete this worksheet and try to get as many right as you can. If you dont' know an answer you can quietly look at your partner's paper. Here is the worksheet that I want you both to do.
>
> General Instructions: Now I want you both to complete this worksheet and try to get as many right as you can. Here is the worksheet that I want you both to do.
>
> Control Instructions: I have some worksheets that I want you to do. These two are different. _____(Subject's name) I will give you this one and _____(other child) you will do this one. Here are the worksheets that I want you to do.

For the children in the alone condition the experimenter simply had the child sit in three different chairs. All children were allowed up to four minutes to complete each form of the worksheet.

Results and Discussion

Contrary to prediction, little glancing was manifested and there was not evidence that the children were outerdirected nor distractible. The analyses on the glancing measures and on the errors committed and time required for the worksheets did not produce significant results.

The children in this experiment appeared to be very tense and competitive. When a child did glance, it was often when their partner turned a page. It was not only the retarded children who appeared anxious to finish; the normal children also seemed very concerned about their progress. Although the normal children were carefully instructed to work at the same pace as their peers, they often seemed to be unable to resist the urge to work as quickly as possible. Occasionally, they even shouted out "I'm done".

The spontaneous remarks made by the retarded children indicated that these children often interpreted the suggestion to look at their partner's paper if they needed help as condescending. Remarks such as "I can do it myself: and "I don't need to look over there" were often made, even by children who did in fact have great difficulty completing the worksheet. These comments lend indirect support to the interpretation of the results of Study I. It was reported that the retarded children suppressed their glancing to the experimenter's puzzle when told they would do that puzzle next. It was suggested that these children may have wanted to demonstrate their ability to complete the puzzle without assistance, although these children did not verbalize such feelings. The pairing of children with peers may have produced an even stronger need to appear self-sufficient. These observations are, of course, speculative, but adjustments to mainstreaming are uncertain and sensitivity to possible problems is necessary (cf. Zigler & Muenchow, 1979).

In addition to this need to appear self-sufficient is the socialization that takes place in a child's development that one does his own work. This is particularly stressed in school where there are often very firm rules in regard to copying or cheating. Kohlberg (1969) reports that at about the age of 6-7 a child is becoming aware that copying someone else's work is not good. At the 4-5 year level, the children do not see copying as bad and take an adult's cue or example as to what is right or expected. Therefore, it would be of interest and value to do a similar study using children with lower MA's than the children in the present study and investigate the problem developmentally.

In conclusion, the results from these investigations indicate that the conditions that unequivocally expose the existence or nonexistence of outer-directed tendencies have not been identified. It appears important to accept the fact that there is much variability in the data since subject's tendencies are being investigated. In the future, it is believed that it will be important to have some studies with very large sample sizes to help systematize the variability. Another important extension of the research would be to get at more direct processing indicators by use of individual subjects and the record of neurophysical and fine eye movement data to investigate in-depth the information processing mechanisms.

Whereas the present findings appear to raise more questions than they answer, it is hoped that they may in the future contribute to more informed experimentation of the issues. Some of the questions that remain relate to the parameters of outerdirectedness. It appears that children decide not only to look for information but they can also decide not to look. Issues such as the type of materials, the instructions given, and the characteristics of the model may possibly influence the amount of glancing; these variables need to be further investigated.